DEVELOP

Dynamic balance

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Service Manual
Theory of Operation

ineo+ 6500

THEORY OF OPERATION TOTAL CONTENTS

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bizhub PRO C6500

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SAFETY AND IMPORTANT WARNING ITEMS

Read carefully the Safety and Important Warning Items described below to understand them before doing service work.

IMPORTANT NOTICE

Because of possible hazards to an inexperienced person servicing this product as well as the risk of damage to the product, Konica Minolta Business Technologies, INC. (hereafter called the KMBT) strongly recommends that all servicing be performed only by KMBT-trained service technicians.
Changes may have been made to this product to improve its performance after this Service Manual was printed. Accordingly, KMBT does not warrant, either explicitly or implicitly, that the information contained in this Service Manual is complete and accurate.
The user of this Service Manual must assume all risks of personal injury and/or damage to the product while servicing the product for which this Service Manual is intended.
Therefore, this Service Manual must be carefully read before doing service work both in the course of technical training and even after that, for performing maintenance and control of the product properly.
Keep this Service Manual also for future service.

DESCRIPTION ITEMS FOR DANGER, WARNING AND CAUTION

In this Service Manual, each of three expressions "⚠**DANGER**", "⚠**WARNING**", and "⚠**CAUTION**" is defined as follows together with a symbol mark to be used in a limited meaning.
When servicing the product, the relevant works (disassembling, reassembling, adjustment, repair, maintenance, etc.) need to be conducted with utmost care.

⚠ **DANGER: Action having a high possibility of suffering death or serious injury**

⚠ **WARNING: Action having a possibility of suffering death or serious injury**

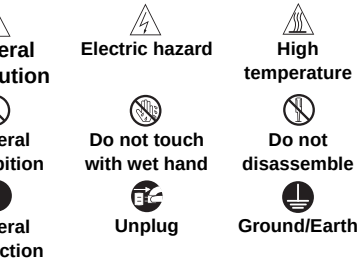
⚠ **CAUTION: Action having a possibility of suffering a slight wound, medium trouble and property damage**

Symbols used for safety and important warning items are defined as follows:

△ **:Precaution when using the copier.**

⃠ **:Prohibition when using the copier.**

● **:Direction when using the copier.**



SAFETY WARNINGS

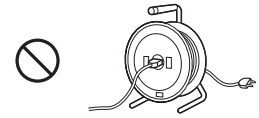
[1] MODIFICATIONS NOT AUTHORIZED BY KONICA MINOLTA BUSINESS TECHNOLOGIES, INC.

Konica Minolta brand products are renowned for their high reliability. This reliability is achieved through high-quality design and a solid service network.
Product design is a highly complicated and delicate process where numerous mechanical, physical, and electrical aspects have to be taken into consideration, with the aim of arriving at proper tolerances and safety factors. For this reason, unauthorized modifications involve a high risk of degradation in performance and safety. Such modifications are therefore strictly prohibited. The points listed below are not exhaustive, but they illustrate the reasoning behind this policy.

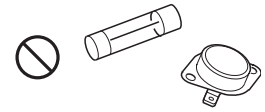
Prohibited Actions

⚠ DANGER

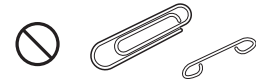
- Using any cables or power cord not specified by KMBT.



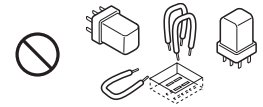
- Using any fuse or thermostat not specified by KMBT. Safety will not be assured, leading to a risk of fire and injury.



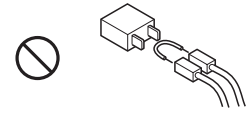
- Disabling fuse functions or bridging fuse terminals with wire, metal clips, solder or similar object.



- Disabling relay functions (such as wedging paper between relay contacts)

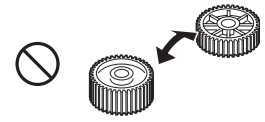


- Disabling safety functions (interlocks, safety circuits, etc.) Safety will not be assured, leading to a risk of fire and injury.



- Making any modification to the product unless instructed by KMBT

- Using parts not specified by KMBT



[2] POWER PLUG SELECTION

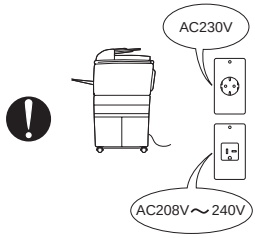
In some countries or areas, the power plug provided with the product may not fit wall outlet used in the area. In that case, it is obligation of customer engineer (hereafter called the CE) to attach appropriate power plug or power cord set in order to connect the product to the supply.

Power Cord Set or Power Plug

⚠ WARNING

- Use power supply cord set which meets the following criteria:
  - provided with a plug having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - provided with three-conductor cable having enough current capacity, and
  - the cord set meets regulatory requirements for the area.

  Use of inadequate cord set leads to fire or electric shock.



- Attach power plug which meets the following criteria:
  - having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - meets regulatory requirements for the area.

  Use of inadequate cord set leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

- Conductors in the power cable must be connected to terminals of the plug according to the following order:
  - Black or Brown: L (line)
  - White or Light Blue: N (neutral)
  - Green/Yellow: PE (earth)

  Wrong connection may cancel safeguards within the product, and results in fire or electric shock.

[3] CHECKPOINTS WHEN PERFORMING ON-SITE SERVICE

Konica Minolta brand products are extensively tested before shipping, to ensure that all applicable safety standards are met, in order to protect the customer and CE from the risk of injury. However, in daily use, any electrical equipment may be subject to parts wear and eventual failure. In order to maintain safety and reliability, the CE must perform regular safety checks.

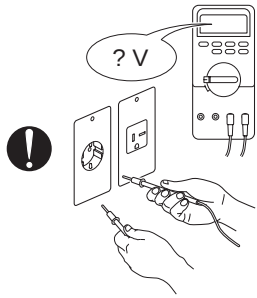
1. Power Supply

Connection to Power Supply

⚠ WARNING

- Check that mains voltage is as specified.

  Connection to wrong voltage supply may result in fire or electric shock.



- Connect power plug directly into wall outlet having same configuration as the plug.

  Use of an adapter leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

  If proper wall outlet is not available, advice the customer to contact qualified electrician for the installation.

- Plug the power cord into the dedicated wall outlet with a capacity greater than the maximum power consumption.

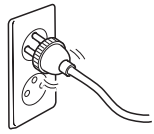
  If excessive current flows in the wall outlet, fire may result.

- If two or more power cords can be plugged into the wall outlet, the total load must not exceed the rating of the wall outlet.

  If excessive current flows in the wall outlet, fire may result.

- Make sure the power cord is plugged in the wall outlet securely.

  Contact problems may lead to increased resistance, overheating, and the risk of fire.



Connection to Power Supply

⚠ WARNING

- Check whether the product is grounded properly.

  If current leakage occurs in an ungrounded product, you may suffer electric shock while operating the product.

  Connect power plug to grounded wall outlet.

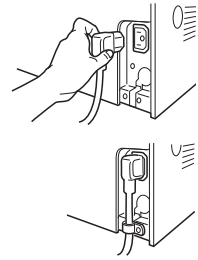
Power Plug and Cord

⚠ WARNING

- When using the power cord set (inlet type) that came with this product, make sure the connector is securely inserted in the inlet of the product.

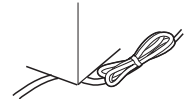
  When securing measure is provided, secure the cord with the fixture properly.

  If the power cord (inlet type) is not connected to the product securely, a contact problem may lead to increased resistance, overheating, and risk of fire.



- Check whether the power cord is not stepped on or pinched by a table and so on.

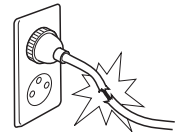
  Overheating may occur there, leading to a risk of fire.



- Check whether the power cord is damaged. Check whether the sheath is damaged.

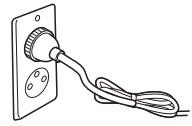
  If the power plug, cord, or sheath is damaged, replace with a new power cord or cord set (with plug and connector on each end) specified by KMBT.

  Using the damaged power cord may result in fire or electric shock.



- Do not bundle or tie the power cord.

  Overheating may occur there, leading to a risk of fire.

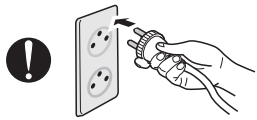


Power Plug and Cord

⚠ WARNING

- Check whether dust is collected around the power plug and wall outlet.

  Using the power plug and wall outlet without removing dust may result in fire.

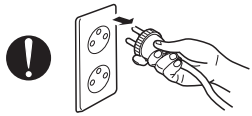


- Do not insert the power plug into the wall outlet with a wet hand.

  The risk of electric shock exists.

- When unplugging the power cord, grasp the plug, not the cable.

  The cable may be broken, leading to a risk of fire and electric shock.

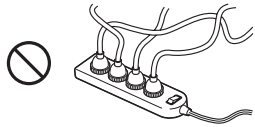


Wiring

⚠ WARNING

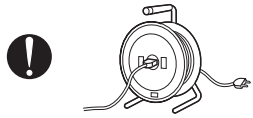
- Never use multi-plug adapters to plug multiple power cords in the same outlet.

  If used, the risk of fire exists.



- When an extension cord is required, use a specified one. Current that can flow in the extension cord is limited, so using a too long extension cord may result in fire.

  Do not use an extension cable reel with the cable taken up. Fire may result.

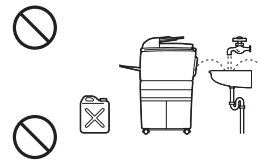


2. Installation Requirements

Prohibited Installation Places

⚠ WARNING

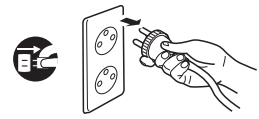
- Do not place the product near flammable materials or volatile materials that may catch fire.
  A risk of fire exists.
- Do not place the product in a place exposed to water such as rain.
  A risk of fire and electric shock exists.



When not Using the Product for a long time

⚠ WARNING

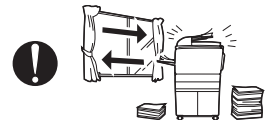
- When the product is not used over an extended period of time (holidays, etc.), switch it off and unplug the power cord.
  Dust collected around the power plug and outlet may cause fire.



Ventilation

⚠ CAUTION

- The product generates ozone gas during operation, but it will not be harmful to the human body.
  If a bad smell of ozone is present in the following cases, ventilate the room.
  a. When the product is used in a poorly ventilated room
  b. When taking a lot of copies
  c. When using multiple products at the same time



Fixing

⚠ CAUTION

- Be sure to lock the caster stoppers.
  In the case of an earthquake and so on, the product may slide, leading to a injury.

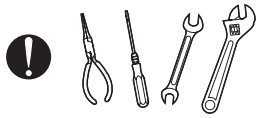
3. Servicing

Inspection before Servicing

⚠ CAUTION

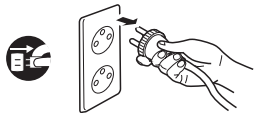
- Before conducting an inspection, read all relevant documentation (service manual, technical notices, etc.) and proceed with the inspection following the prescribed procedure in safety clothes, using only the prescribed tools. Do not make any adjustment not described in the documentation.

  If the prescribed procedure or tool is not used, the product may break and a risk of injury or fire exists.



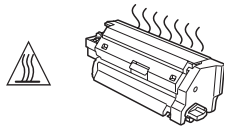
- Before conducting an inspection, be sure to disconnect the power plugs from the product and options.

  When the power plug is inserted in the wall outlet, some units are still powered even if the POWER switch is turned OFF. Arisk of electric shock exists.



- The area around the fixing unit is hot.

  You may get burnt.

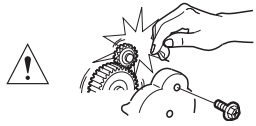


Work Performed with the Product Powered On

⚠ WARNING

- Take every care when making adjustments or performing an operation check with the product powered.

  If you make adjustments or perform an operation check with the external cover detached, you may touch live or high-voltage parts or you may be caught in moving gears or the timing belt, leading to a risk of injury.



- Take every care when servicing with the external cover detached.

  High-voltage exists around the drum unit. A risk of electric shock exists.

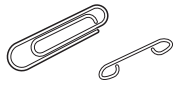
Safety Checkpoints

⚠ WARNING

- When taking a report of problems from a user, check each part and repair properly.
  A risk of product trouble, injury, and fire exists.

- Check the exterior and frame for edges, burrs, and other damages.
  The user or CE may be injured.

- Do not allow any metal parts such as clips, staples, and screws to fall into the product.
  They can short internal circuits and cause electric shock or fire.



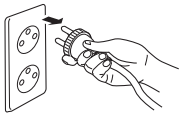
- Check wiring for squeezing and any other damage.
  Current can leak, leading to a risk of electric shock or fire.

- Carefully remove all toner remnants and dust from electrical parts and electrode units such as a charging corona unit.
  Current can leak, leading to a risk of product trouble or fire.

- Check high-voltage cables and sheaths for any damage.
  Current can leak, leading to a risk of electric shock or fire.

- Check electrode units such as a charging corona unit for deterioration and sign of leakage.
  Current can leak, leading to a risk of trouble or fire.

- Before disassembling or adjusting the write unit (P/H unit) incorporating a laser, make sure that the power cord has been disconnected.
  The laser light can enter your eye, leading to a risk of loss of eyesight.

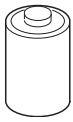


Safety Checkpoints

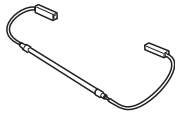
⚠ WARNING

- Do not remove the cover of the write unit. Do not supply power with the write unit shifted from the specified mounting position.
  The laser light can enter your eye, leading to a risk of loss of eyesight.

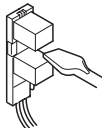
- When replacing a lithium battery, replace it with a new lithium battery specified in the Parts Guide Manual. Dispose of the used lithium battery using the method specified by local authority.
  Improper replacement can cause explosion.



- After replacing a part to which AC voltage is applied (e.g., optical lamp and fixing lamp), be sure to check the installation state.
  A risk of fire exists.



- Check the interlock switch and actuator for loosening and check whether the interlock functions properly.
  If the interlock does not function, you may receive an electric shock or be injured when you insert your hand in the product (e.g., for clearing paper jam).



- Make sure the wiring cannot come into contact with sharp edges, burrs, or other pointed parts.
  Current can leak, leading to a risk of electric shock or fire.

- Make sure that all screws, components, wiring, connectors, etc. that were removed for safety check and maintenance have been reinstalled in the original location. (Pay special attention to forgotten connectors, pinched cables, forgotten screws, etc.)
  A risk of product trouble, electric shock, and fire exists.

Handling of Consumables

⚠ WARNING

- Toner and developer are not harmful substances, but care must be taken not to breathe excessive amounts or let the substances come into contact with eyes, etc. It may be stimulative.

  If the substances get in the eye, rinse with plenty of water immediately. When symptoms are noticeable, consult a physician.

- Never throw the used cartridge and toner into fire.

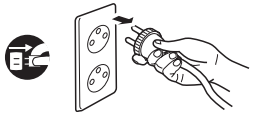
  You may be burned due to dust explosion.

Handling of Service Materials

⚠ CAUTION

- Unplug the power cord from the wall outlet.

  Isopropyl alcohol and acetone are highly flammable and must be handled with care. A risk of fire exists.



- Do not replace the cover or turn the product ON before any solvent remnants on the cleaned parts have fully evaporated.

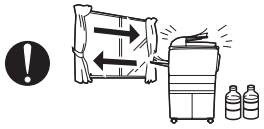
  A risk of fire exists.

- Use only a small amount of cleaner at a time and take care not to spill any liquid. If this happens, immediately wipe it off.

  A risk of fire exists.

- When using any solvent, ventilate the room well.

  Breathing large quantities of organic solvents can lead to discomfort.



4. Fuse

Fuse

⚠ CAUTION

- CAUTION
  Double pole / neutral fusing
- ATTENTION
  Double pôle / Fusible sur le neutre

5. Used Batteries Precautions

Handling of batteries

⚠ CAUTION

- ALL Areas

  CAUTION

  Danger of explosion if battery is incorrectly replaced.
  Replace only with the same or equivalent type recommended by the manufacturer.
  Dispose of used batteries according to the manufacturer's instructions.

- Germany

  VORSICHT!

  Explosionsgefahr bei unsachgemäßem Austausch der Batterie.
  Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ.
  Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

- France

  ATTENTION

  Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.
  Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
  Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

- Denmark

  ADVARSEL!

  Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
  Udskiftning må kun ske med batteri af samme fabrikat og type.
  Levér det brugte batteri tilbage til leverandøren.

- Finland, Sweden

  VAROITUS

  Paristo voi räjähtää, jos se on virheellisesti asennettu.
  Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
  Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

  VARNING

  Explosionsfara vid felaktigt batteribyte.
  Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
  Kassera använt batteri enligt fabrikantens instruktion.

- Norway

  ADVARSEL

  Eksplosjonsfare ved feilaktig skifte av batteri.
  Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
  Brukte batterier kasseres i henhold til fabrikantens instruksjoner.

SAFETY INFORMATION

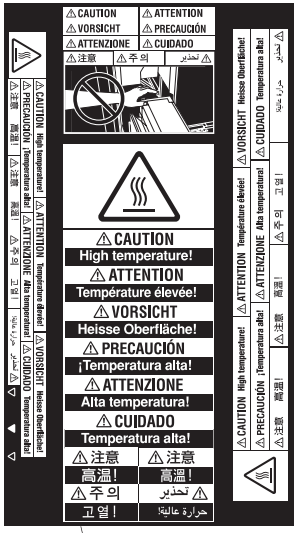
IMPORTANT NOTICE

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products manufactured since August 1, 1976. Compliance is mandatory for products marketed in the United States.

This copier is certified as a "Class 1" laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. Since radiation emitted inside this copier is completely confined within protective housings and external covers, the laser beam cannot escape during any phase of normal user operation.

INDICATION OF WARNING ON THE MACHINE

Caution labels shown below are attached in some areas on/in the machine.
When accessing these areas for maintenance, repair, or adjustment, special care should be taken to avoid burns and electric shock.



⚠ CAUTION

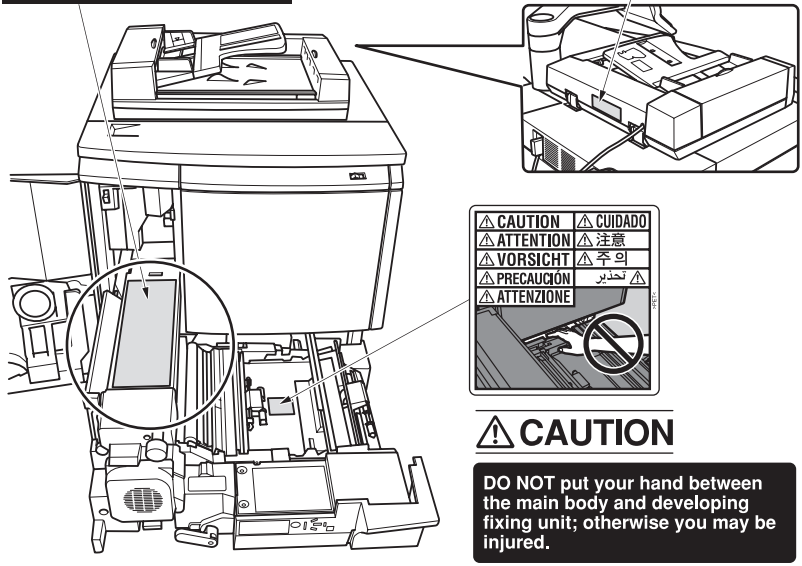
DO NOT put your hand between the main body and developing fixing unit; otherwise you may be injured.

⚠ CAUTION

The fixing unit is very hot. To avoid getting burned DO NOT TOUCH.

⚠ CAUTION

DO NOT INSERT your finger into the two RADF hinge portions; otherwise you may be injured.



⚠ CAUTION

DO NOT put your hand between the main body and developing fixing unit; otherwise you may be injured.

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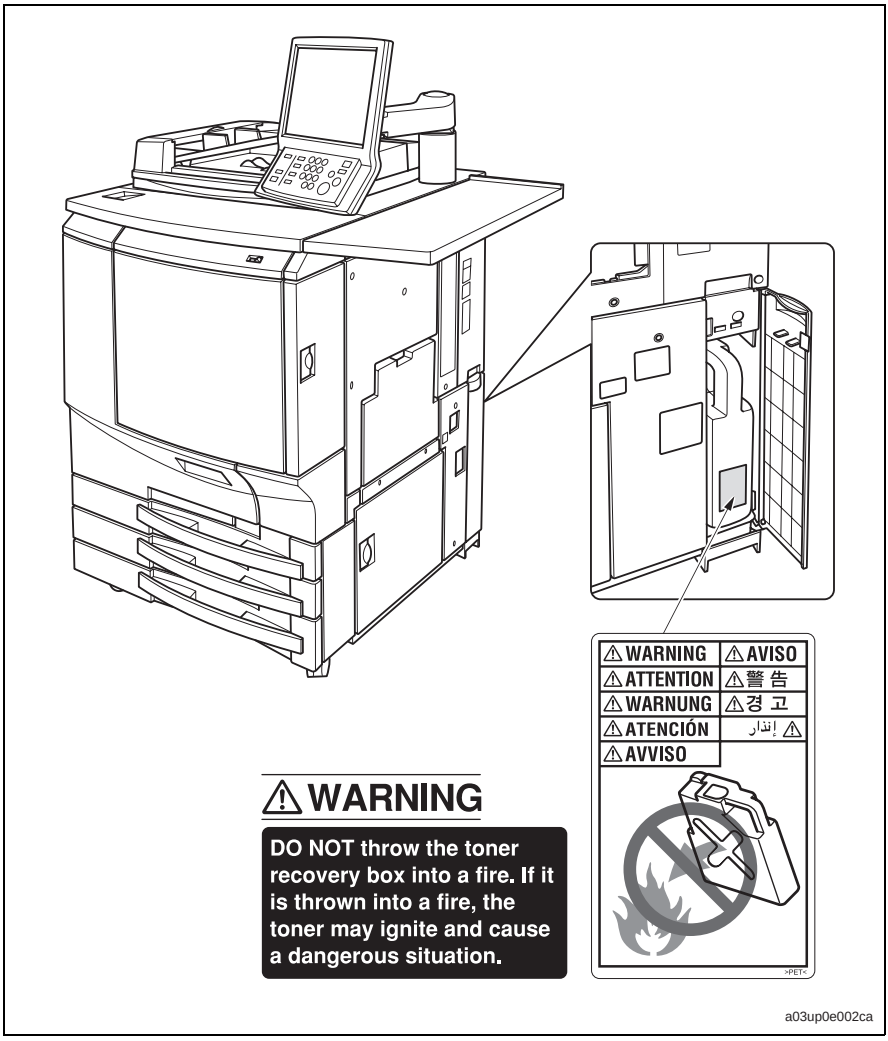

⚠ CAUTION:

- **You may be burned or injured if you touch any area that you are advised by any caution label to keep yourself away from. Do not remove caution labels. And also, when the caution label is peeled off or soiled and cannot be seen clearly, replace it with a new caution label.**

MEASURES TO TAKE IN CASE OF AN ACCIDENT

1. If an accident has occurred, the distributor who has been notified first must immediately take emergency measures to provide relief to affected persons and to prevent further damage.
2. If a report of a serious accident has been received from a customer, an on-site evaluation must be carried out quickly and KMBT must be notified.
3. To determine the cause of the accident, conditions and materials must be recorded through direct on-site checks, in accordance with instructions issued by KMBT.
4. For reports and measures concerning serious accidents, follow the regulations specified by every distributor.

Legal restrictions on copying

Certain types of originals must never be copied with the purpose or intent to pass copies of such originals off as the originals.
The following is not a complete list, but is meant to be used as a guide to responsible copying.

<Financial Instruments>

- Personal checks
- Traveler's checks
- Money orders
- Certificates of deposit
- Bonds or other certificates of indebtedness
- Stock certificates

<Legal Originals>

- Food stamps
- Postage stamps (canceled or uncanceled)
- Checks or drafts drawn by government agencies
- Internal revenue stamps (canceled or uncanceled)
- Passports
- Immigration papers
- Motor vehicle licenses and titles
- House and property titles and deeds

<General>

- Identification cards, badges, or insignias
- Copyrighted works without permission of the copyright owner

In addition, it is prohibited under any circumstances to copy domestic or foreign currencies, or works of art without permission of the copyright owner.
When in doubt about the nature of an original, consult with legal counsel.
!
Detail
In order to prohibit the illegal reproduction of certain originals, such as paper currency, this machine is equipped with a counterfeit prevention feature.
Due to the counterfeit prevention feature that this machine is equipped with, images may be distorted.

Composition of the service manual

This service manual consists of the following sections and chapters:

<Theory of Operation section>

OUTLINE:	System configuration, product specifications, unit configuration, and paper path
COMPOSITION/OPERATION:	Configuration of each unit, explanation of the operating system, and explanation of the control system

This section gives, as information for the CE to get a full understanding of the product, a rough outline of the object and role of each function, the relationship between the electrical system and the mechanical system, and the timing of operation of each part.

<Field service section>

OUTLINE:	System configuration, and product specifications
MAINTENANCE:	Service schedule *, maintenance steps, list of service tools and directions for use *, firmware version up method *, and removal/reinstallation methods of major parts
ADJUSTMENT/SETTING:	Utility mode *, Tech. Rep. mode *, security and mechanical adjustment
TROUBLESHOOTING*:	List of jam codes, their causes, operation when a jam occurs and its release method, and list of error codes, their causes, operation when a warning is issued and estimated abnormal parts.
APPENDIX*:	Parts layout drawings, connector layout drawings, timing chart, overall layout drawing

This section gives, as information required by the CE at the site (or at the customer's premise), a rough outline of the service schedule and its details, maintenance steps, the object and role of each adjustment, error codes and supplementary information.

The details of items with an asterisk "*" are described only in the service manual of the main body.

Notation of the service manual

A. Product name

In this manual, each of the products is described as follows:

(1)	IC board:	Standard printer
(2)	bizhub PRO 920:	Main body
(3)	PS-502 PostScript3 Option:	PS3 Option
(4)	Microsoft Windows 95:	Windows 95
	Microsoft Windows 98:	Windows 98
	Microsoft Windows Me:	Windows Me
	Microsoft Windows NT 4.0:	Windows NT 4.0 or Windows NT
	Microsoft Windows 2000:	Windows 2000
	Microsoft Windows XP:	Windows XP
	When the description is made in combination of the OS's mentioned above:	
		Windows 95/98/Me
		Windows NT 4.0/2000
		Windows NT/2000/XP
		Windows 95/98/Me/NT/2000/XP

B. Brand name

The company names and product names mentioned in this manual are the brand name or the registered trademark of each company.

C. Electrical parts and signals

Those listed by way of example below are not exhaustive, but only some instances among many.

Classification	Load symbol	Ex. of signal name	Description
Sensor	PS	IN	Sensor detection signal
		PS	
		Door PS1	
		SIG	
		102 PS	
Solenoid	SD	24V	Power to drive the solenoid
		DRV	Drive signal
		SOL	
Clutch	CL	24V	Power to drive the clutch
		DRV	Drive signal
		SOL	

Classification	Load symbol	Ex. of signal name	Description
Motor	M	24V	Power to drive the motor
		CONT	Drive signal
		DRV1	Drive signals of two kinds
		DRV2	
		D1	
		D2	
Motor	M	_U	Drive signals (control signals) of three kinds
		_V	
		_W	
		DRV1	
		DRV2	
		DRV3	
		D1	Drive signals (control signals) of four kinds Motor, phases A and B control signals
		D2	
		D3	
		D4	
		DRV A	
		DRV $\overline{A}$	
		DRV B	
		DRV $\overline{B}$	
		A	
		/A	
		B	
		/B	
		AB	
		BB	
		CLK, PLL	PLL control signal
		LCK, Lock, LD	PLL lock signal
		FR	Forward/reverse rotation signal
		EM, Lock, LCK, LD	Motor lock abnormality
		BLK	Drive brake signal
		P/S	Power/stop
		S/S	Operating load start/stop signal
		SS	
		CW/CCW, F/R	Rotational direction switching signal
		ENB	Effective signal
		TEMP_ER	Motor temperature abnormality detection signal
Fan	FM	24V	Power to drive the fan motor
		CONT, DRIVE	Drive signal
		HL	Speed control signal (2 speeds)
		EM, Lock, LCK, FEM	Detection signal
Others		TH1.S, ANG	Analog signal

Classification	Load symbol	Ex. of signal name	Description
Ground		SG, S.GND, S_GND	Signal ground
		PG, P.GND	Power ground
Serial com-munication		DCD	Data carrier detection
		SIN	Serial input
		SOUT	Serial output
		DTR	Data terminal operation available
		GND	Signal ground (earth)
		DSR, DSET	Data set ready
		RTS	Transmission request signal
		CTS	Consent transmission signal
		RI	Ring indicator
		TXD	Serial transmission data
		RXD	Serial reception data

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KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

bizhub PRO C6500 Main body

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show to the left of the revised section.
  A number within represents the number of times the revision has been made.

- To indicate clearly a section revised, show in the lower outside section of the corresponding page.
  A number within represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

2006/09	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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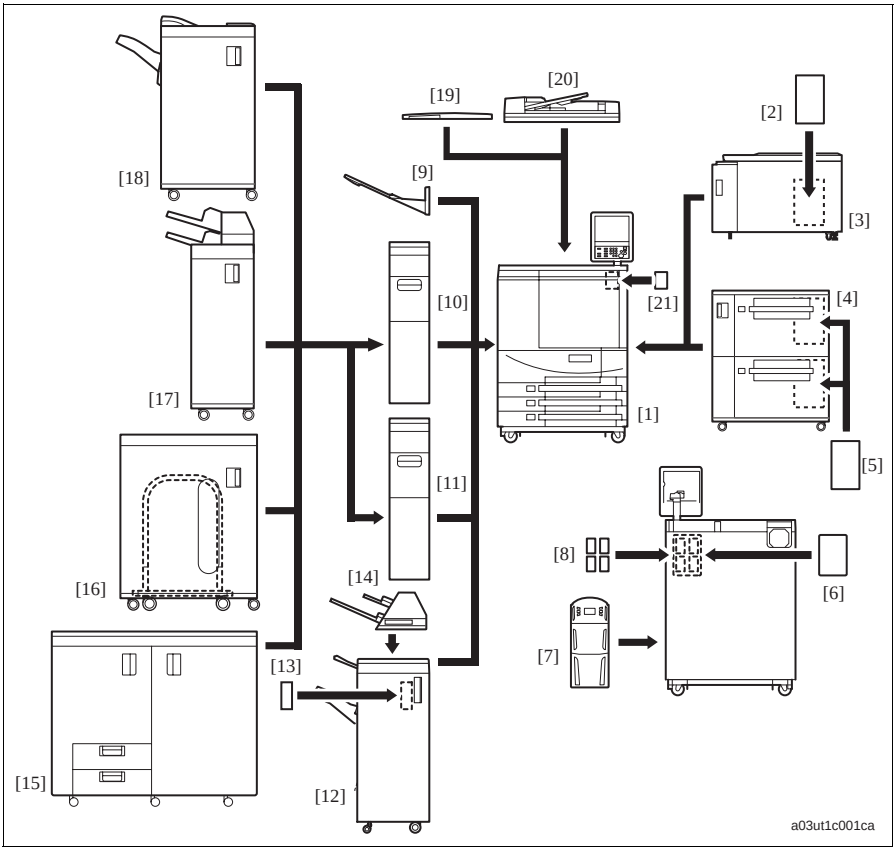
■ OUTLINE

1. SYSTEM CONFIGURATION

A. System configuration



[1] Main body
[2] Dehumidifier fan heater (HT-503)
[3] Large capacity paper feed tray (LU-202)
[4] Large capacity paper feed tray (PF-601)
[5] Dehumidifier fan heater (HT-504)
[6] Built-in type image controller (IC-408)
[7] Server type image controller (IC-303)
[8] Hard disk (HD-506)
[9] Output tray (OT-502)
[10] Conveyance cooling unit (RU-503)
[11] Conveyance cooling unit (RU-504)
[12] Saddle stitching staple finisher (FS-607)
[13] Punch kit (PK-512/513)
[14] Cover inserter (PI-502)
[15] Saddle stitching unit (SD-501)
[16] Large capacity stacker (LS-501)
[17] Punch and folding unit (FD-501)
[18] staple finisher (FS-503)
[19] Original cover (OC-506)
[20] Auto double sided original feeder (DF-609)
[21] Key counter

B. Configuration for optional device connection

Note

- **Any combination other than those listed below is not available.**

No.	Paper feeding option	Combinations for finishing			AC power to be connected to
1	PF-601 *1	RU-504 *4	FS-503		External (RU-504)
2	PF-601 *1	RU-503 *4	FD-501		External (FD-501)
3	PF-601 *1	RU-503 *4	SD-501		External (SD-501)
4	PF-601 *1	RU-503 *4	LS-501		External (LS-501)
5	PF-601 *1	RU-504 *4	FD-501	FS-503	*5
6	PF-601 *1	RU-504 *4	LS-501	FS-503	External (RU-504/LS-501)
7	PF-601 *1	RU-503 *4	LS-501	SD-501	External (LS-501/SD-501)
8	PF-601 *1	RU-503 *4	FD-501	LS-501	External (FD-501/LS-501)
9	PF-601 *1	RU-503 *4	FD-501	SD-501	External (FD-501/SD-501)
10	LU-202 *2	FS-607 *3			—
11	PF-601 *1	OT-502			—
12	LU-202 *2	OT-502			—

*1 HT-504 can be connected to PF-601 arbitrarily.

*2 HT-503 can be connected to LU-202 arbitrarily.

*3 PK-512/513 or PI-502 can be connected to FS-607 arbitrarily.

*4 Use RU-503 or RU-504 as described below:
When connecting to FS-503 :RU-504
When not connecting to FS-503:RU-503
RU-504 can be substituted for RU-503, but RU-503 cannot be used when connecting to FS-503.

*5 Metric destination: External (RU-504/FD-501)
Inch destination: External (RU-504)

2. PRODUCT SPECIFICATIONS

A. Type

Type	Console type (floor-mounted type)
Copying method	Four-drum tandem laser electrostatic method
Original stand	Fixed
Original alignment	Left rear standard
Photo conductor	OPC
Writing method	Two-beam laser scanning method
Paper capacity	Three trays (500 sheets x 3, 80g/m^2) Multi bypass (250 sheets, 80g/m^2) PF-601 (3000 sheets x 2, 80g/m^2)*1 LU-202 (2500 sheets, 80g/m^2)*1

*1 PF-601 and LU-202 are optional.

B. Functions

Original	Sheet, book, solid object	
Max. original size	A3, or 11 x 17 (Custom paper is Max.303 x 438mm)	
Copy size	Tray1, 2, 3	SRA3, A3, B4, SRA4, A4, SRA4S, A4, A4S, B5, B5S, A5S 13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S 8½ x 13, 8¼ x 13, 8 ⅛ x 13¼, 8 x 13 8K, 16K, 16KS Tab paper (A4, 8½ x 11) Custom paper (Max. 330 x 487mm, Min. 140 x 182 mm)
	Bypass feed	SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5, B5S, A5, A5S, B6S, A6S, 13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S 8½ x 13, 8½ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS Tab paper (A4, 8½ x 11) Custom paper (Max. 330 x 487mm, Min. 140 x 182 mm)
	ADU	SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5, B5S, A5, A5S 13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS Custom paper (Max. 330 x 487mm, Min. 140 x 182 mm)

Magnification	Fixed magnification	Inch: x 1.000, x 2.000, x 1.545, x 1.294, x 1.214, x 0.785, x 0.772, x 0.647, x 0.500 Metric: x 1.000, x 2.000, x 1.414, x 1.224, x 1.154, x 0.866, x 0.816, x 0.707, x 0.500
	Zoom magnification	x 0.25 to x 4.00 (at the step of 0.1%)
Warm-up time	Inch: 390 seconds or less Metric: 420 seconds or less	
First copy out time	Full color	6.5 seconds or less (A4 / 8½ x 11)
	Monochrome	6.5 seconds or less (A4 / 8½ x 11)
	Black-and-white	5.0 seconds or less (A4 / 8½ x 11)
Continuous copy speed	Full color	65 copies /min. (A4 / 8½ x 11)
	Monochrome	65 copies /min. (A4 / 8½ x 11)
	Black-and-white	65 copies /min. (A4 / 8½ x 11)
Continuous copy count	Up to 9,999 sheets	
Resolution	Scan	Main scanning : 600 dpi Sub-scanning : 600 dpi
	Write	Main scanning : 600 dpi Sub-scanning : 600 dpi (1800 dpi *1)
Standard memory	256 MB for each color (Y, M, C, K)	
Expansion memory (HD-506)	30 GB for each color (Y, M, C, K)	
No. of originals in memory (Reference value)	Full color	Line1/Line2/Dot1/Dot2: 23 sheets [5461 sheets *2] Priority in high compression: 110 sheets [16384 sheets *2] Conditions Original: KM #101/A3 (color) Density: Standard Mode: Text/Photo, printed original, life size Memory capacity: Standard 256 MB
	Black-and-white/monochrome	Line1/Line2/Dot1/Dot2: 126 sheets or more [16384 sheets *2] Priority in high compression: 271 sheets or more [16384 sheets *2] Conditions Original: FAX test chart #4 /A4 Density: Standard Mode: Text/Photo, printed original, life size Memory capacity: Standard 256 MB
Interface section	RJ45 Ethernet, Serial port (RS232-C), Service port, Serial port (USB TypeB),Connector for printer controller	

*1 When "smoothing" is selected at the print setting

*2 When HD-506 is installed.

C. Available types of paper and ranges of paper weight

Type of paper	Tray1, 2, 3	Bypass feed
Plain paper	O A4 / 8½ x 11 or larger : 64 to 256 g/m^2 A4 / 8½ x 11 or smaller : 64 to 209 g/m^2	O 64 to 300g/m^2
High Quality paper	O A4 / 8½ x 11 or larger : 64 to 256 g/m^2 A4 / 8½ x 11 or smaller : 64 to 209 g/m^2	O 64 to 300g/m^2
Color Specific paper	O A4 / 8½ x 11 or larger : 64 to 256 g/m^2 A4 / 8½ x 11 or smaller : 64 to 209 g/m^2	O 64 to 300g/m^2
Coated_GL, ML, GO , MO paper	△ A4 / 8½ x 11 or larger : 81 to 256 g/m^2 A4 / 8½ x 11 or smaller : 81 to 209 g/m^2	△ 64 to 300g/m^2
Label paper*1	—	O
OHP film*1 *2	O	O
Index paper*1 *3	O	O

O:Available △: Available only one sheet at a time —: Not available

*1 Paper type of the label paper can be Plain, High Quality, Color Specific, or Coated_GL, ML, GO, MO paper. Available ranges of paper weight (thickness) of the label paper are the same with those of the corresponding paper type.

*2 Print quality not guaranteed.

*3 Paper loading direction predetermined, single-sided printing only.

D. Materials

Parts name	Useful life	Type name
Toner bottle /Y	24,000 prints *1	TN610Y
Toner bottle /M	24,000 prints *1	TN610M
Toner bottle /C	24,000 prints *1	TN610C
Toner bottle /K	35,000 prints *1	TN610K
Drum cartridge	200,000 prints *2	DU-102
Developer /Y	200,000 prints *2	DV610 (Y)
Developer /M	200,000 prints *2	DV610 (M)
Developer /C	200,000 prints *2	DV610 (C)
Developer /K	200,000 prints *2	DV610 (K)
Toner collection box Assy	50,000 prints *3	A03UA365

*1 A4 original at 5% coverage for each color.

*2 The end of actual useful life is reached when the number of sheets is printed, or when the total drive distance reaches a certain level, whichever comes first.

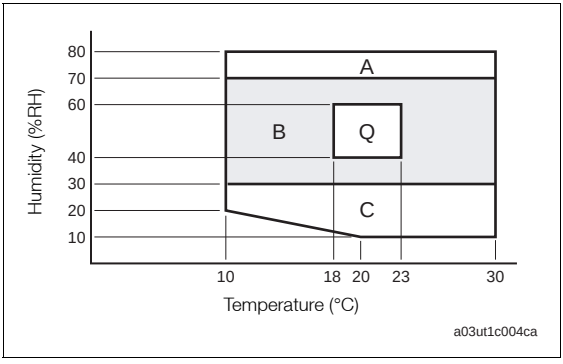
*3 The end of actual useful life is detected by the waste toner full sensor provided in the toner collection box.

E. Maintenance

Maintenance cycle	Every 200,000 prints
Machine service life	5,000,000 prints or 5 years (whichever earlier)
Ave. number of prints *1	35,000 to 75,000 per month
Max. number of prints *1	Q zone *2 : 300,000 per month, 10,000 per day
	B,C zone *2 : 150,000 per month, 8,500 per day
	A zone *2 : 100,000 per month, 5,000 per day

*1 The number of prints include all monochrome, solid color, and full color printings.

*2 The zone mean a temp&humidity range indicated in the graph below.



F. Machine data

Power source	Inch: AC208 to 240V 16A, 60Hz Metric: AC230V 15A, 50Hz	
Maximum power consumption	Inch: 4,550W or less (B. When the type of the optional unit connection configuration (P2) is No. 9) 3,950W or less (B. When the type of the optional unit connection configuration (P2) is No. 10) Metric: 4,060W or less (B. When the type of the optional unit connection configuration (P2) is No. 9) 3,550W or less (B. When the type of the optional unit connection configuration (P2) is No. 10)	
Dimensions	Main body + OC-506	786 (W) x 992 (D) x 1,056 (H) mm
	Main body + DF-609 + RU-503 + LS-501 + SD-501	3,852 (W) x 992 (D) x 1,414 (H) mm
Weight	Approx. 360kg	

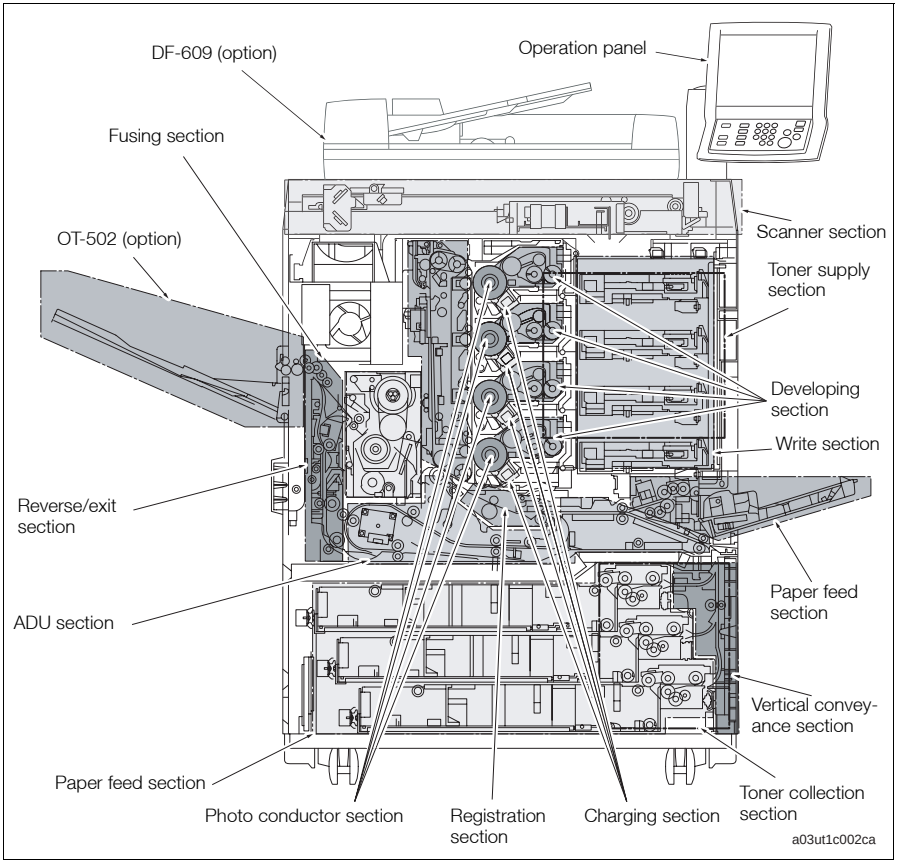
G. Operating environment

Temperature	10 to 30 °C
Humidity	10 to 80%RH (with no condensation)

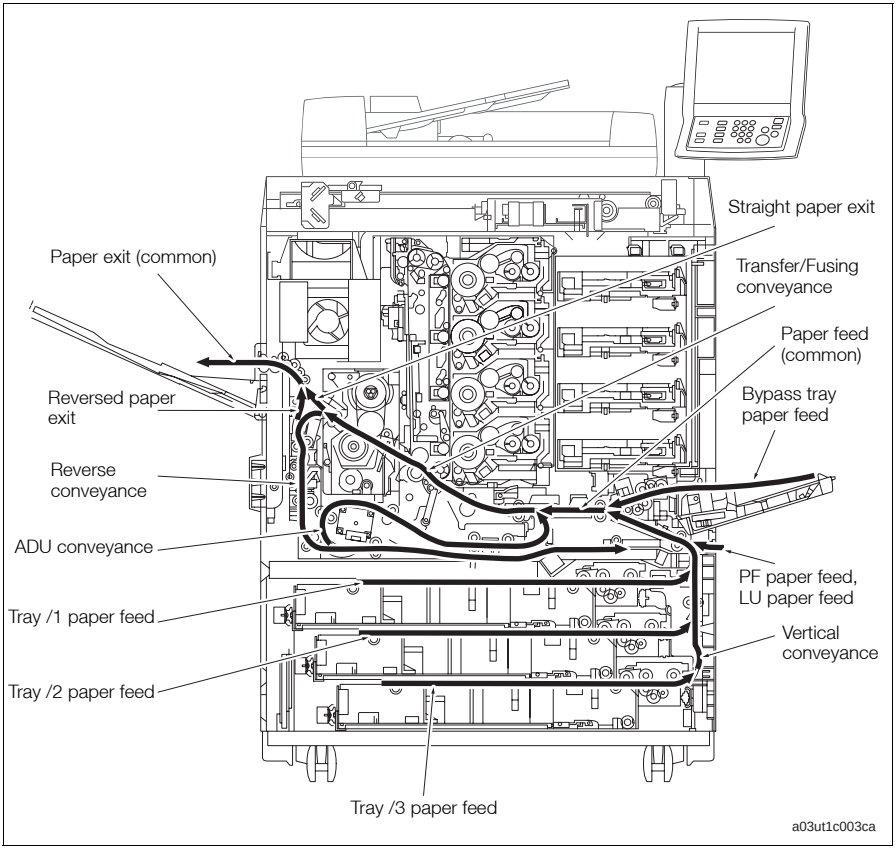
Note

- **The information herein may be subject to change for improvement without notice.**

3. UNIT CONFIGURATION



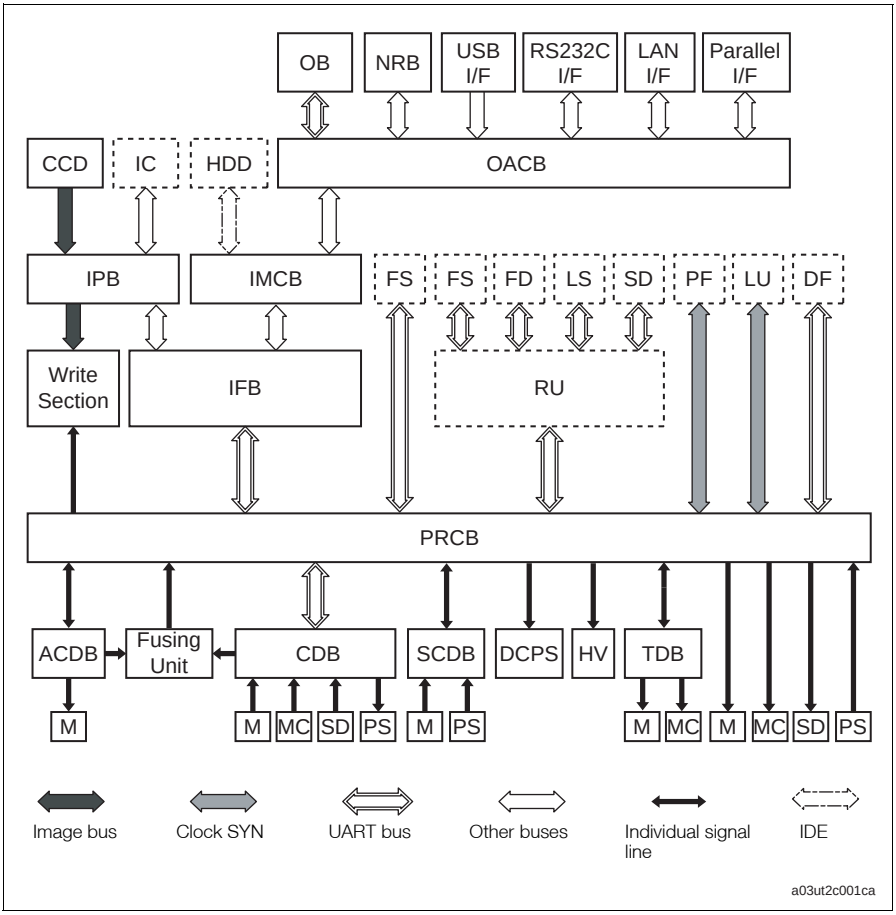
4. PAPER PATH


Straight paper exit
Paper exit (common)
Transfer/Fusing conveyance
Paper feed (common)
Reversed paper exit
Bypass tray paper feed
Reverse conveyance
ADU conveyance
PF paper feed, LU paper feed
Tray /1 paper feed
Vertical conveyance
Tray /2 paper feed
Tray /3 paper feed
a03ut1c003ca

Blank page

■ CONFIGURATION/OPERATION

5. CONTROL BLOCK DIAGRAM

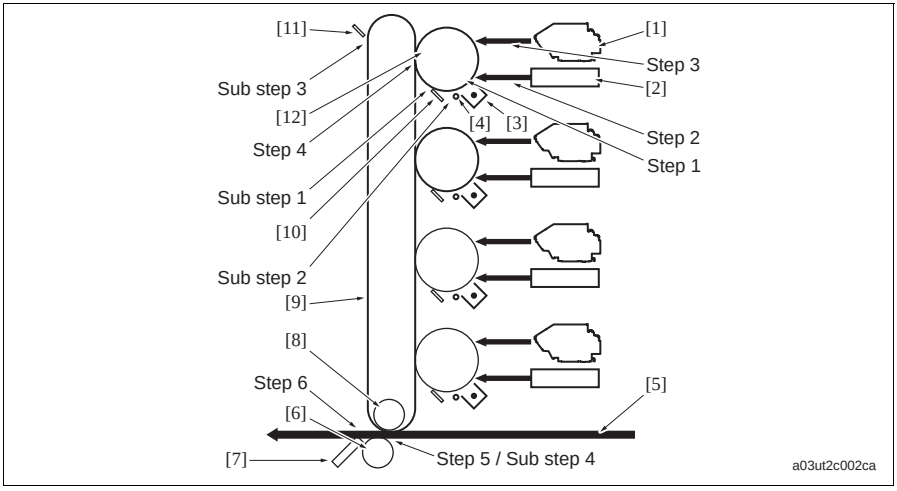


Board name	Functions	ISW
Overall control board (OACB)	Performs overall control of the MFP.	Yes
Image memory control board (IMCB)	Controls image memory (DRAM + HDD Option).	No
Image processing board (IPB)	Controls various image processing.	No
Printer control board (PRCB)	Controls printer mechanism load applied to the components such as motors, fans, solenoids and sensors.	Yes
NVRAM board (NRB)	Performs various adjustments/stores setting data.	No

6. IMAGE CREATING PROCESS

6.1 Flow and functions

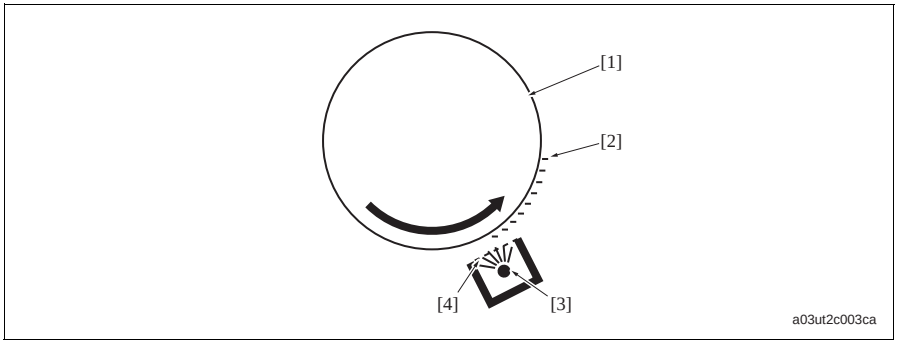
Steps	Processes	Functions
Step 1	Charging process	Distributes electrostatic charges uniformly over the surface of the four photoconductor drums.
Step 2	Laser exposure process	Forms an electrostatic latent image on each photoconductor drum.
Step 3	Image development process	Develops the electrostatic latent image with toner on each photoconductor drum.
Step 4	First transfer process	Transfers the four toner images (YMCK) created on each photoconductor drum to the transfer belt one by one to create a complete toner image on the belt.
Step 5	Second transfer process	Transfers the toner image on the transfer belt to paper.
Step 6	Separation process	Separates the toner-transferred paper from the transfer belt.
Sub step 1	Drum cleaning	Removes the remaining toner on the surface of the photoconductor drums after the first transfer.
Sub step 2	Exposure before charging	Discharges the surface of the photoconductor drums after the drum cleaning.
Sub step 3	Transfer belt cleaning	Removes the remaining toner on the transfer belt surface after the second transfer.
Sub step 4	Second transfer roller /Lw cleaning	Removes the remaining toner on the second transfer roller/Lw surface after the second transfer.
Sub step 5	Toner collection	Collects the toner removed at sub step 1 and 3. (This step is not illustrated in the figure below.)



[1] Developing unit
[2] Write unit
[3] Charging corona
[4] Erase lamp (EL)
[5] Paper
[6] Second transfer roller /Lw
[7] Discharging section for separation
[8] Second transfer roller /Up
[9] Transfer belt
[10] Blade (for drum cleaning)
[11] Blade (for transfer belt cleaning)
[12] Drum

6.2 Charging process (Step 1)

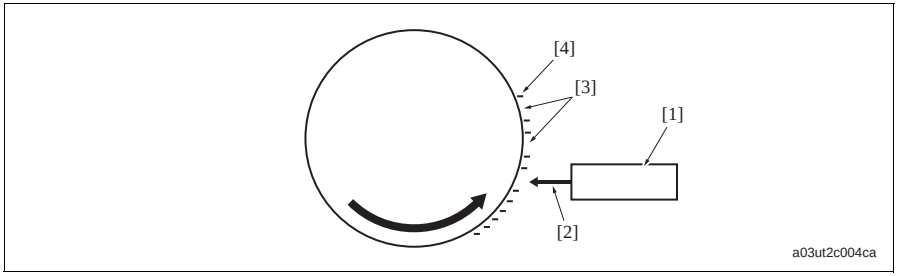
A negative high DC voltage is applied to the gold-plate tungsten wire of the charging corona which is provided for each Y, M, C, and K photoconductor drums. Then the wire discharges toward the drum in order to charge the entire drum surface with the negative electrostatic charge. The charge on the drum is uniformly distributed on the drum surface with the charging control plate.



[1] Drum
[2] Negative electrostatic charge
[3] Charging corona
[4] Charging control plate

6.3 Laser exposure process (Step 2)

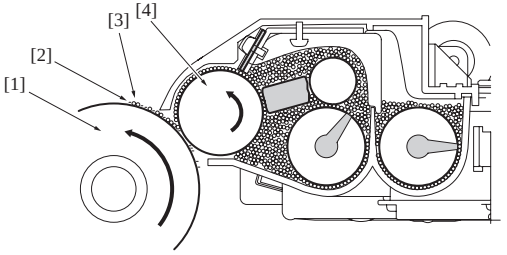
The material used for the drum surface has a characteristic that holds electrostatic charges in darkness and discharges under light. This enables creating a electrostatic latent image on the drum with laser beam. The laser beam draws the image shining on certain points on the drum where the text or image presents according to color separation data (Y, M, C, K data) created on the image processing section.



[1] Write unit
[2] Laser beam
[3] Discharged points
[4] Negative electrostatic charge

6.4 Image development process (Step 3)

The non-image points of the electrostatic latent image on the photoconductor drum is charged negatively while the image points are neutralized. As the toner is negatively charged, it is attracted to the image points on the drum and as a result, a visible toner image is created on the drum. This operation is referred to as "development."

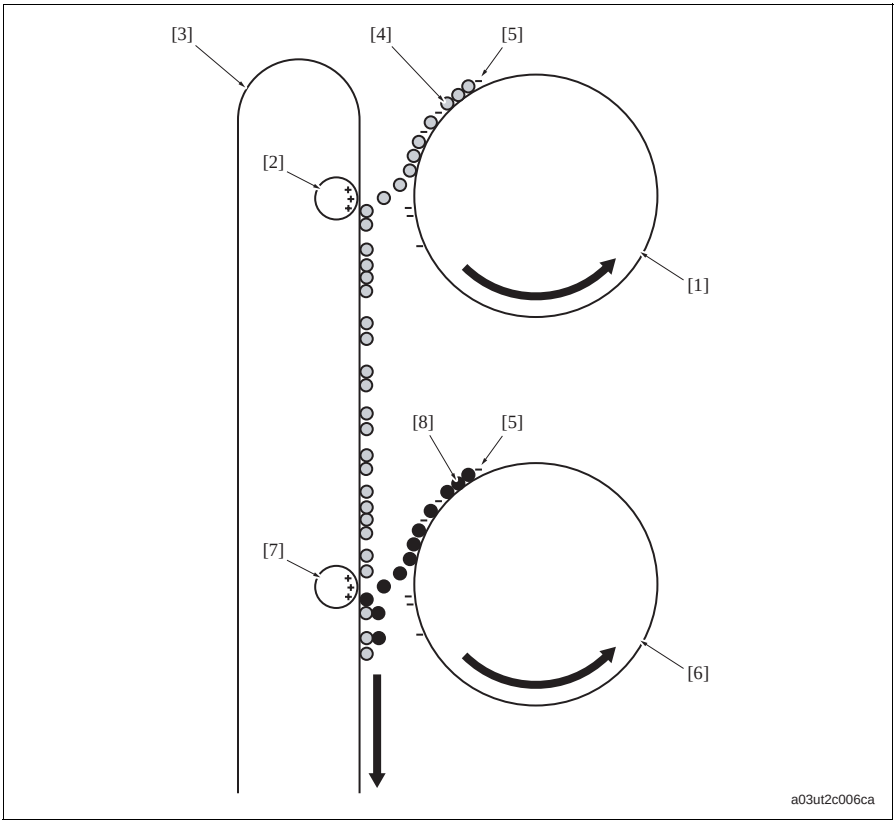


a03ut2c005ca

[1] Drum
[2] Negative electrostatic charge
[3] Negatively charged toner
[4] Developing roller

6.5 First transfer process (Step 4)

The toner images created on each of the Y, M, C, and K photoconductor drums are transferred to the transfer belt one by one in the order of Y, M, C, and K. As a result, the four toner images are overlaid and a complete toner image is formed on the belt. This is called as "first transfer."
In order to carry out the first transfer, a positive high DC voltage bias is applied to the first transfer roller provided on the back surface of the transfer belt. This makes the transfer belt surface have a positive potential higher than that of the each drum surface so that the toner on the drums are attracted to the transfer belt.

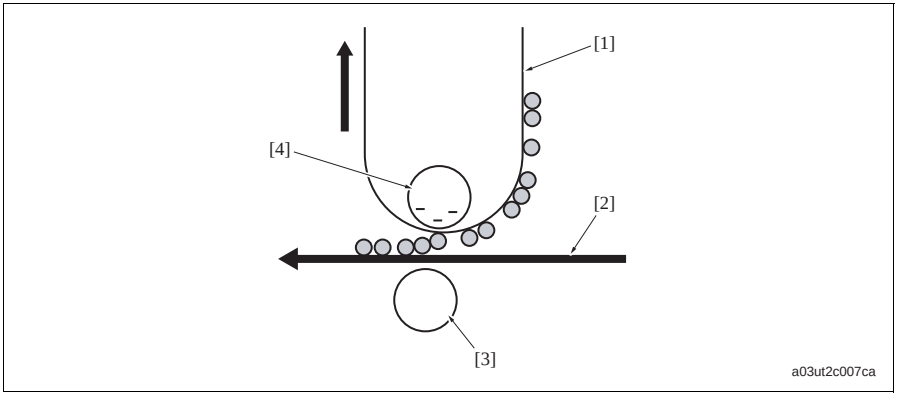


[1] Drum/Y
[2] First transfer roller/Y
[3] Transfer belt
[4] Toner/Y
[5] Negative electric charges
[6] Drum/M
[7] First transfer roller/M
[8] Toner/M

6.6 Second transfer process (Step 5)

Transferring the complete toner image formed on the transfer belt to paper is called as "second transfer." For the second transfer, the second transfer roller/Lw located at the back side of the transfer belt rotates to transport paper applying a pressure on the belt, while a high negative DC bias is applied to the second transfer roller/Up inside the belt.

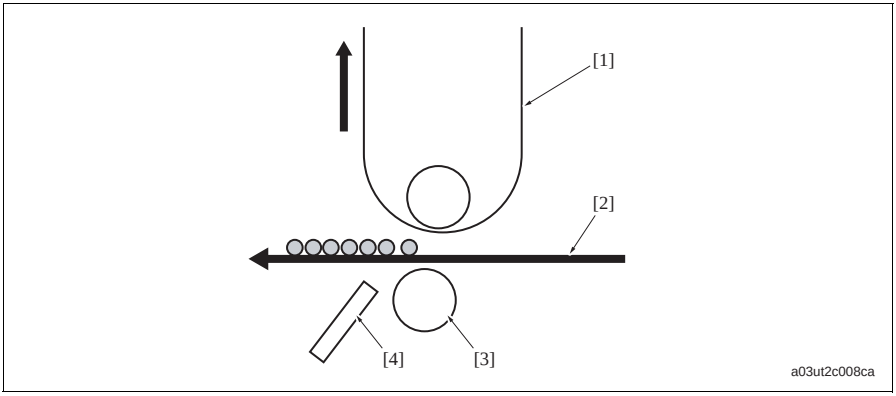
Because of a potential difference between the two rollers, the toner image can be transferred to the paper from the belt.



[1] Transfer belt
[2] Paper
[3] Second transfer roller /Lw
[4] Second transfer roller /Up

6.7 Separation process (Step 6)

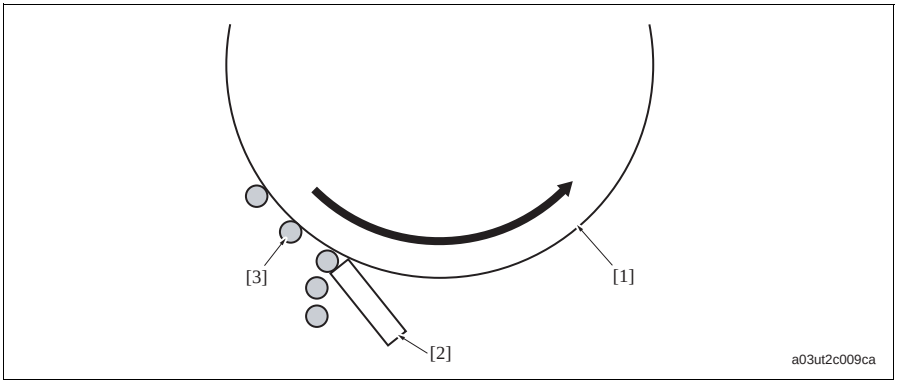
For the second transfer, the paper is negatively charged by the second transfer roller/Up so that the paper makes intimate contact with the transfer belt. Once the toner is transferred to the paper, the paper must be separated from the belt. The separating operation is called as "separation."
In order to achieve the separation, a high AC or DC bias is applied to the discharging section to attract the paper separating it from the transfer belt.



[1] Transfer belt
[2] Paper
[3] Second transfer roller /Lw
[4] Discharging section for separation

6.8 Drum cleaning (Sub step 1)

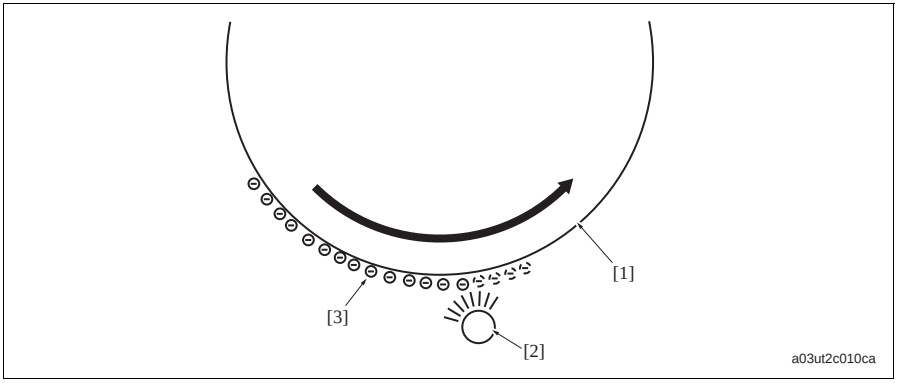
The toner remains slightly on the drum after the first transfer. The process that cleans the remaining toner off is called "drum cleaning."
The cleaning is made by the cleaning blade provided for each drum. Its edge made of urethane rubber scrapes the toner off the drum surface.



[1] Drum
[2] Cleaning blade
[3] Remaining toner

6.9 Exposure before charging (Sub step 2)

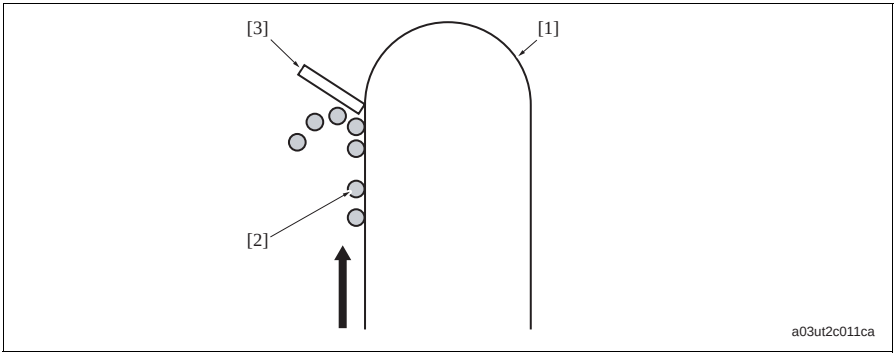
After the drum cleaning, electric potential slightly remains on the drum surface while the toner is completely removed.
Since charging the drum for the next copying or printing cannot be normally performed with the remaining potential, the potential on the drum surface is completely neutralized by means of erase lamp (EL). This process is called "Exposure before charging."



[1] Drum
[2] Erase lamp (EL)
[3] Remained electric charge

6.10 Transfer belt cleaning (Sub step 3)

The toner remains slightly on the transfer belt after the second transfer. The process that cleans the remaining toner off is called "Transfer belt cleaning".
The transfer belt cleaning is made by the cleaning blade. Its edge made of urethane rubber scrapes the toner off the belt surface.

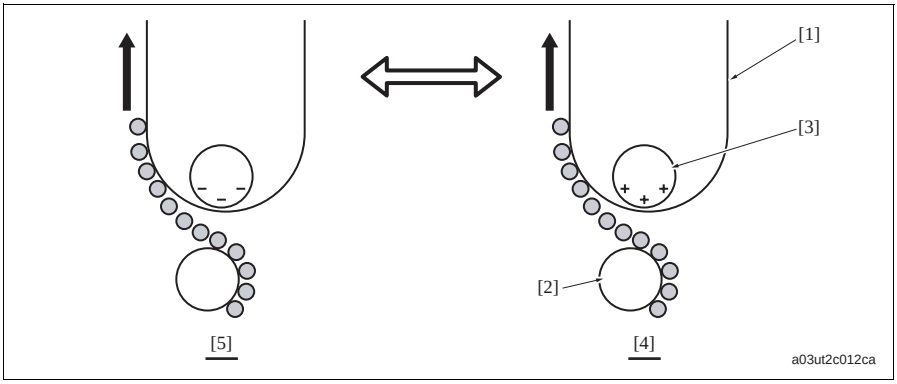


[1] Transfer belt
[2] Remaining toner
[3] Cleaning blade

6.11 Second transfer roller/Lw cleaning (Sub step 4)

Since the second transfer roller/Lw directly contacts with the toner on the transfer belt, the roller is contaminated with the toner.

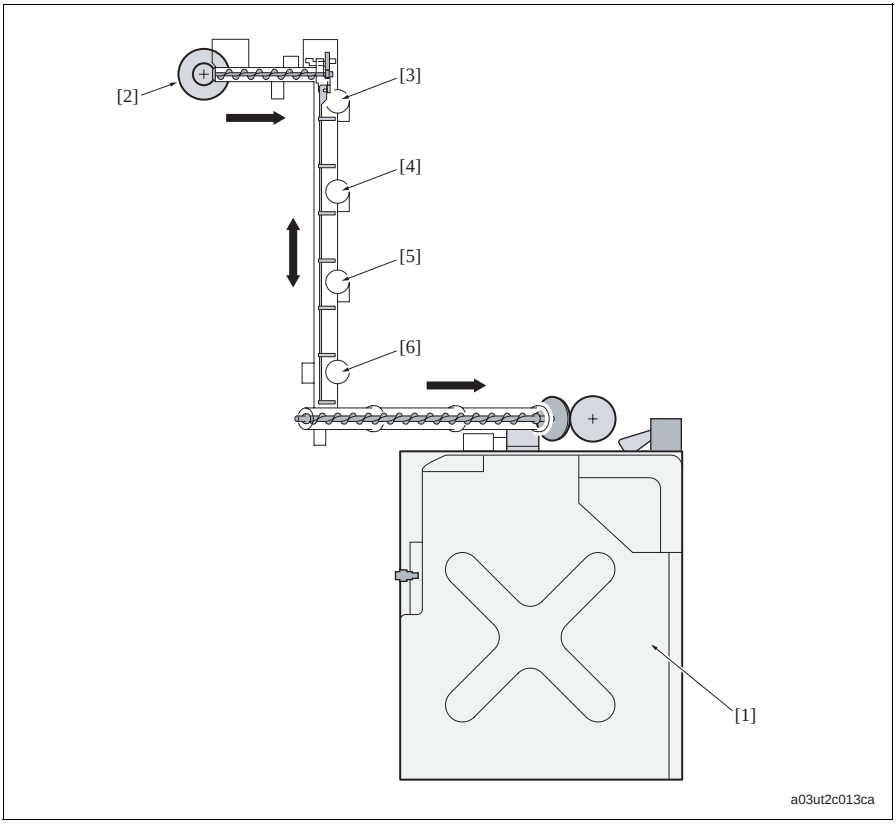
To clean the roller, a negative and positive high DC bias is applied to the second transfer roller/Up alternately so that the toner on the second transfer roller/Lw is attracted to the transfer belt. The toner transferred to the belt surface is removed by the transfer belt cleaning described in the previous section.



[1] Transfer belt
[2] Second transfer roller /Lw
[3] Second transfer roller /Up
[4] When a positive DC bias is applied
[5] When a negative DC bias is applied

6.12 Toner collection (Sub step 5)

The toner removed from the drums and the transfer belt is collected to the toner collection box through the toner collection screw.



[1] Toner collection box
[2] Toner collecting port (Transfer belt)
[3] Toner collecting port (Drum/Y)
[4] Toner collecting port (Drum/M)
[5] Toner collecting port (Drum/C)
[6] Toner collecting port (Drum/K)

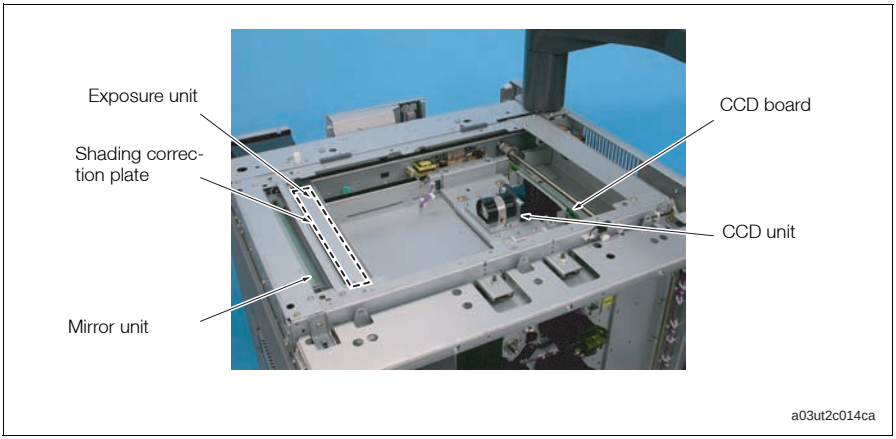
6.13 Process speed

The printer has three process speed settings to accommodate with various types of paper. One of the three settings is used according to the paper thickness/weight and whether the paper is coated or not.

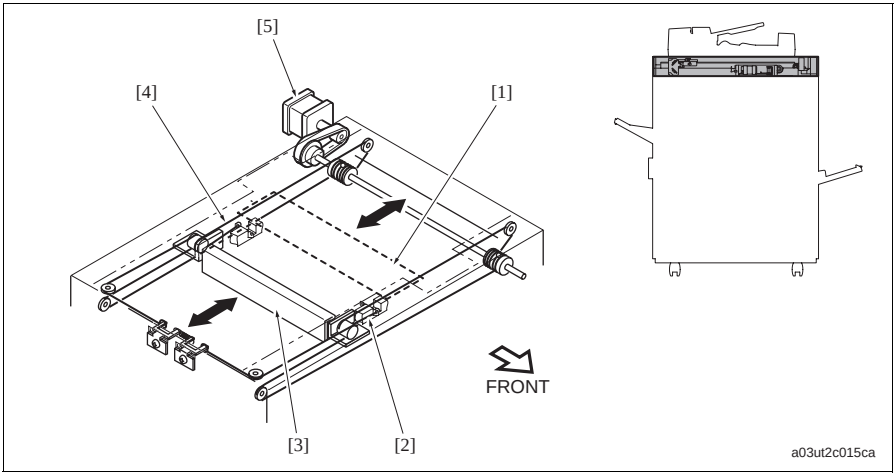
Paper weight	Plain paper	Glossy photo paper
64 to 135 g/m^2	300 m/s (1/1 speed)	—
106 to 135 g/m^2	—	207.7 m/s (2/3 speed)
136 to 209 g/m^2	207.7 m/s (2/3 speed)	150 m/s (1/2 speed)
210 to 300 g/m^2	150 m/s (1/2 speed)	—

7. SCANNER SECTION

7.1 Configuration



7.2 Drive



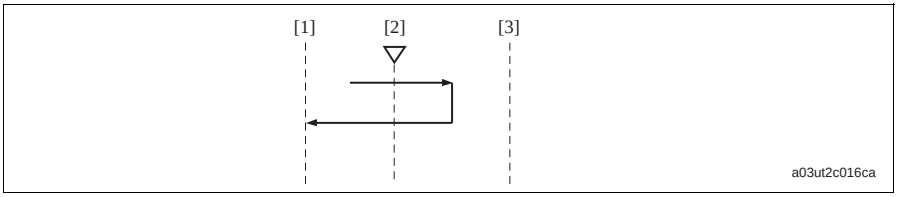
[1] Exposure unit
[2] Scanner wire/Fr
[3] V mirror unit
[4] Scanner wire/Rr
[5] Scanner motor (M1)

7.3 Operation

7.3.1 Scanner/Exposure lamp control

A. Home position search of the exposure unit

- When the sub power switch (SW2) is turned on, the exposure unit starts to search the home position after the specified time passed.

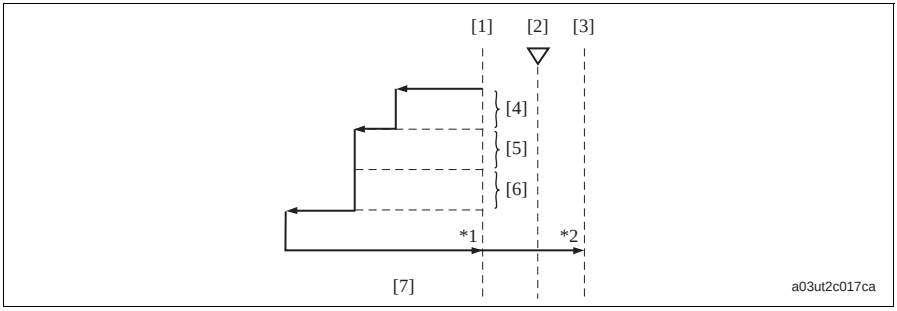


[1] Home position
[2] Scanner home sensor (PS1)
[3] Platen APS position

B. Shading correction

- After searching the home position, the exposure unit performs shading correction.
- The white standard board attached to the rear side of the platen glass is used for the shading correction.
- There are two types of shading correction: white correction (two times) and black correction (one time).
- The white correction is performed by reading the white standard board (L1) with the exposure lamp turned on.
- The black correction is performed by reading the brightness with the L1 turned off.
- To acquire the white correction data, the brightness of each pixel is compared between the first time correction and the second time correction, and the brighter one is used as a white correction data.
- The shading correction reading operation differs between when the sub power switch (SW2) ON and when the start button ON.

(1) The reading operation when the SW2 ON



[1] Home position
[2] Scanner home sensor (PS1)
[3] Platen APS position
[4] White correction (First time)
[5] White correction (Second time)
[6] Black correction
[7] Returning the amount moved

*1 Platen cover or DF is closed: The exposure unit stops at the home position.
*2 Platen cover or DF is opened: The exposure unit stops at the platen APS position.

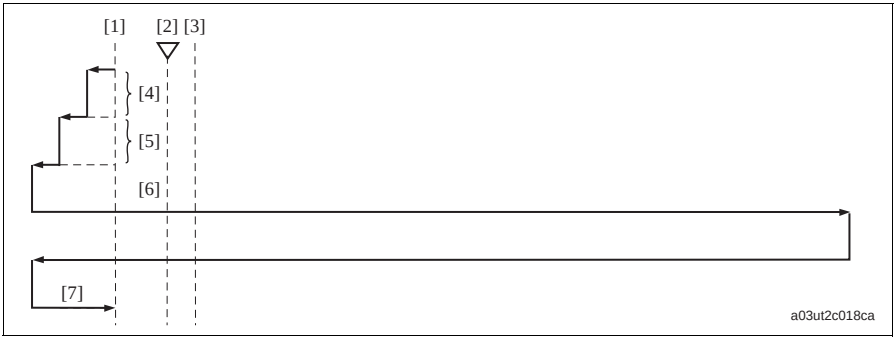
(2) The reading operation when the start button is turned on

- After finishing the movement for the shading correction, the exposure unit shifts to scanning operation automatically.
- The other movements of the exposure unit are the same as when the SW2 is turned on.

C. Original reading mode

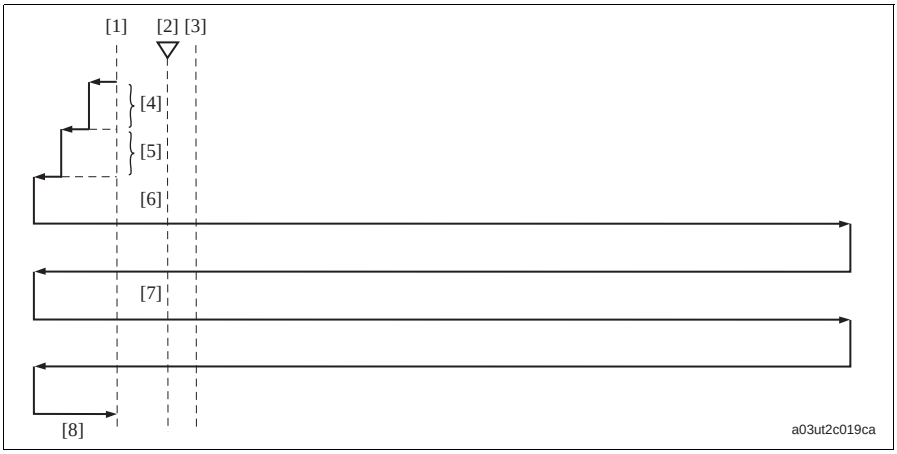
- There are two original reading modes; platen mode and DF mode.
- Whether the density setting is set to manual or AE, the two modes differ in movement of the exposure unit.

(1) When selecting the manual density setting



[1] Home position
[2] Scanner home sensor (PS1)
[3] Platen APS position
[4] White correction (First time)
[5] White correction (Second time)
[6] Exposure scan
[7] Home position search

(2) When selecting the AE density setting



[1] Home position
[2] PS1
[3] Platen APS position
[4] White correction (First time)
[5] White correction (Second time)
[6] AE scan
[7] Exposure scan
[8] Home position search

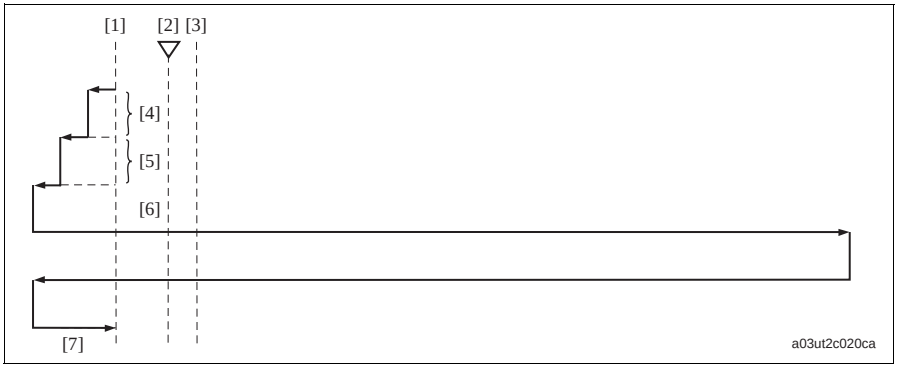
D. Original reading control

- The light reflected off the original goes to the CCD sensor through the lens.
- The CCD sensor outputs an electric signal (analog) corresponding to the amount of light.
- The CCD sensor includes three separate photo receivers corresponding to each color R, G and B.
- The R, G and B analog signals are individually converted to a digital signal (A/D convert) in the CCD board (CCDB).
- The A/D convert is controlled by the image processing board (IPB).

E. Original reading timing

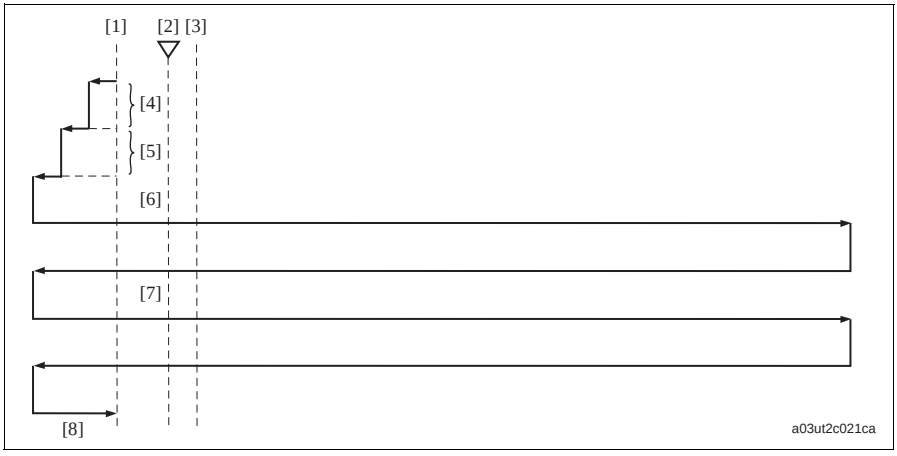
- When AE/ACS is not set, the exposure unit movement is the same in the platen mode and the DF.
- When AE/ACS is set, the exposure unit movement differs between the platen mode and the DF mode.

(1) When AE/ACS is not set



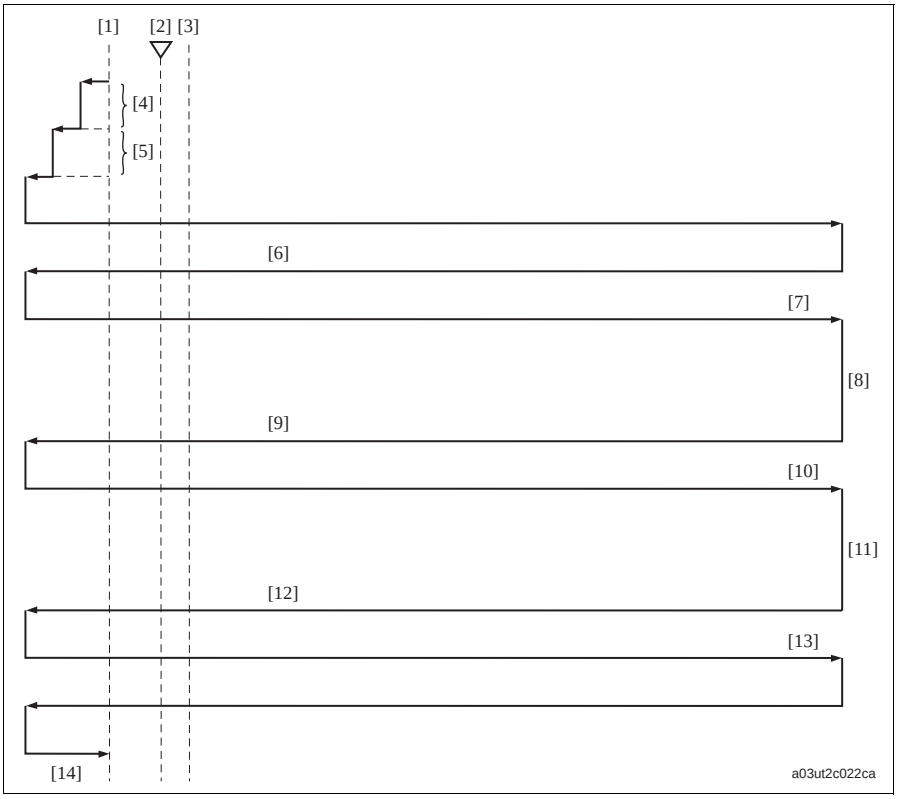
[1] Home position
[2] Scanner home sensor (PS1)
[3] Platen APS position
[4] White correction (First time)
[5] White correction (Second time)
[6] Exposure scan (270 mm/s)
[7] Home position search

(2) When AE/ACE is set (Platen mode)



[1] Home position
[2] PS1
[3] Platen APS position
[4] White correction (First time)
[5] White correction (Second time)
[6] AE/ACS scan (409 mm/s)
[7] Exposure scan (270 mm/s)
[8] Home position search

(3) When AE/ACS is set (DF mode)



[1] Home position
[2] PS1
[3] Platen APS position
[4] White correction (First time)
[5] White correction (Second time)
[6] AE/ACS scan for the first page (409 mm/s)
[7] Exposure scan for the first page (270 mm/s)
[8] Timing of the original replacement
[9] AE/ACS scan for the second page (409 mm/s)
[10] Exposure scan for the second page (270 mm/s)
[11] Timing of the original replacement
[12] AE/ACS scan for the last page (409 mm/s)
[13] Exposure scan for the last page (270 mm/s)
[14] Home position search

7.3.2 Original size detection control

A. Detection method

- The detection method differs between in the platen mode and in the DF mode.

(1) DF mode

- Refer to DF-609.

(2) Platen mode

- Main scanning direction: CCD sensor
- Sub-scanning direction: Turning on/ off of the APS sensors/1 (PS3) and /2 (PS4)

Original size	CCD sensor (Length of detection: mm)	PS3 (ON/OFF)	PS4 (ON/OFF)
Smallest	102	OFF	OFF
B5S	182	ON	OFF
B5	257	OFF	OFF
B4	257	ON	ON
A4S	210	ON	OFF
A4	297	OFF	OFF
A3	297	ON	ON
8½ x 11S	215.9	ON	OFF
8½ x 11	279.4	OFF	OFF
8½ x 14	215.9	ON	ON
11 x 17	279.4	ON	ON

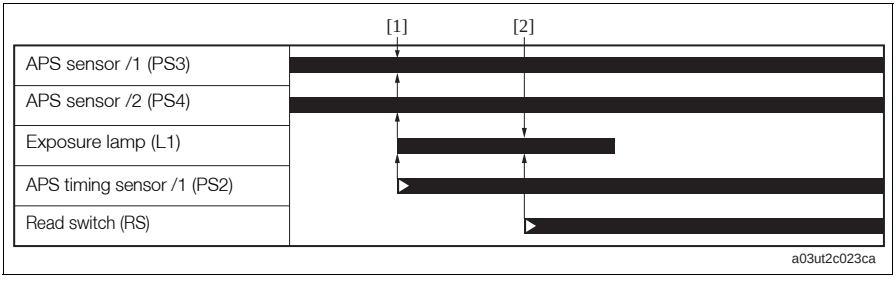
B. Detection timing

(1) DF mode

- Refer to DF-609.

(2) Platen mode

- The original size in the main scanning direction is detected twice and the larger one is regarded as the original size.



[1] First Original size detection (Main scanning/Sub-scanning direction detection)

[2] Second original size detection (main scanning direction)

7.3.3 Original reading area

- The original reading area for both in platen mode and DF mode is determined as described below.

A. When the automatic "Erase outside of original" is turned ON

Out of original auto-reading area equals to the max. original size.

B. When the automatic "Erase outside of original" is turned OFF

The scanning size specified in the user setting menu "Erase outside of original" equals to the original reading area.

Setting for Erase outside of original	Mode	Scanning size
Erase outside of original	All	Original size
Auto-size/Auto magnification only	Auto-size/Auto magnification	Original size
	Manual	Paper size
Except original Glass (1:1)	Equal magnification to platen	Paper size
	Other than equal magnification to platen	Original size

7.3.4 AE/ACS control

- When AE/ACS is selected, the density of the original is detected, and the print density is automatically adjusted.
- When ACS is selected, the color of the original is detected, and color or monochrome print is selected automatically.

A. AE/ACS sampling area

- The original density sampling area for both in platen mode and DF mode is same as the original reading area.

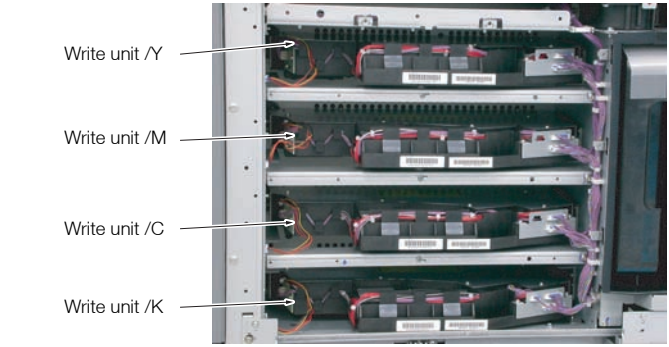
7.3.5 Image processing

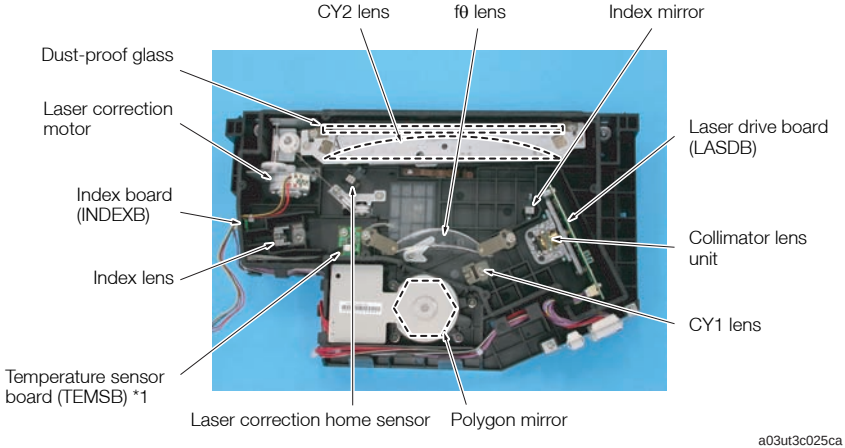
For the image processing, the following items are provided: Refer to"24. IMAGE PROCESSING " for details.
(See P.117)

- AOC (automatic offset control)
- AGC (automatic gain control)
- Shading correction
- AE processing
- ACS processing
- Brightness/Density conversion
- Filter/scaling
- Half tone processing (Error diffusion)
- Compression
- Image data storage
- Screen processing

8. WRITE SECTION

8.1 Configuration

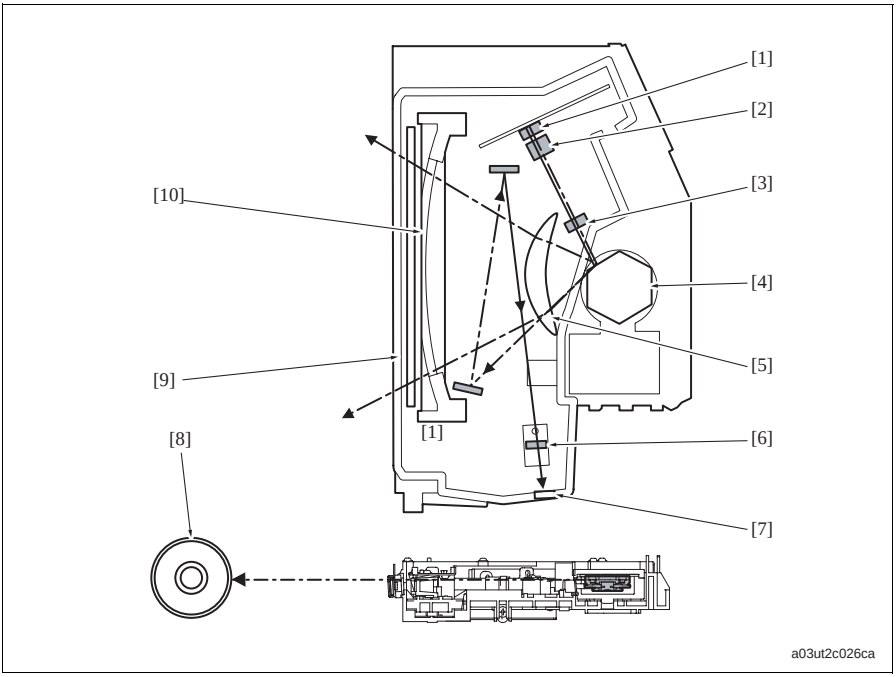




*1 Write unit /K only.

8.2 Operation

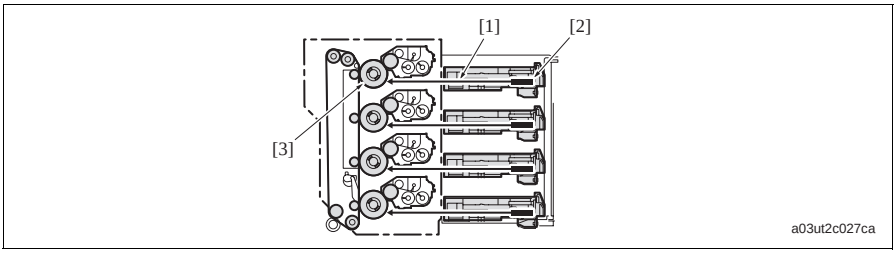
8.2.1 Laser beam path



[1] Laser diode
[2] Collimator lens
[3] CY1 lens
[4] Polygon mirror
[5] fθ lens
[6] Index lens
[7] Index board (INDEXB)
[8] Drum
[9] Dust-proof glass
[10] CY2 lens

8.2.2 Write unit control

- The read data converted into digital data in the CCD board is sent to the image process board (IPB).
- The RGB signals are converted to the YMCK signals in the IPB.
- The converted YMCK signals are distributed to the corresponding laser drive board; /Y (LASDB/Y), /M (LASDB/M), /C (LASDB/C), /K (LASDB/K) in the IPB.
- The laser drive boards emit laser beam to create an electrostatic latent image on the corresponding drums.
- Each laser drive board emits two beams per one laser diode, and writes two lines per one scanning.
- The write start position is determined according to the INDEX signals detected by the Index boards/Y (INDEXB/Y), /M (INDEXB/M), /C (INDEXB/C) and /K (INDEXB/K) to prevent the misalignment of scanned image in main scanning direction.



[1] Laser beam
[2] Polygon mirror
[3] Drum

8.2.3 Color registration control

In a black-and-white copier, a toner image formed on its drum can be directly transferred onto paper. In a color copier, the process is much complicated. This machine uses four photoconductor drums correspond to yellow, magenta, cyan, and black colors. In order to create a complete toner image, the four separated single-color toner images formed on the drums must be overlaid on the transfer belt without misalignment. The control to prevent the misalignment is referred to as "color registration control."

A. Types of the color registration control

There are following five color registration controls and the five controls are carried out for each color correcting yellow (Y), magenta (M), and cyan (C) with reference to black (K).

The color registration control in the "Partial horizontal magnification" is made by adjusting the write units mechanically. The other four color registration controls are performed electrically.

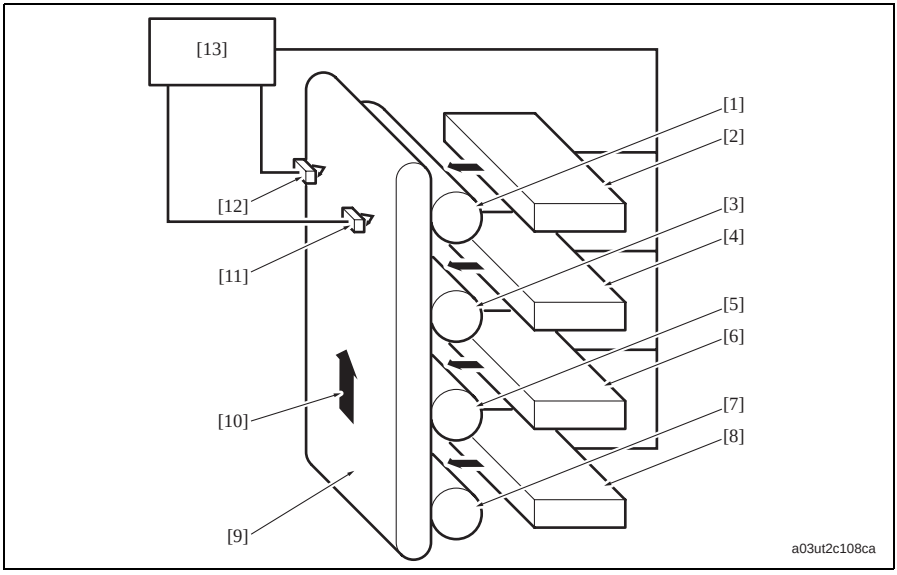
Correction type		Correction method
Drift in the main scanning direction		Adjusts the write start timing in the main scan direction
Drift in the sub-scanning direction		Adjusts the write start timing in the sub-scan direction
Entire horizontal magnification		Adjusts the clock frequency for the wire units
Inclination		Adjusts the angle of the CY2 lens 2 (CY2 lens is driven by the laser correction motor)
Partial horizontal magnification		Adjusts the position of the write unit (parallelism against the drum) See adjusting the timing for the image adjustment in service mode.

*1 To show the symptoms plainly, the sample figures in the table indicate the positions of only two colors.

*2 The gap between the upper and lower lines in the sample figures for "Drift in the main scanning direction", "Entire horizontal magnification" and "Partial horizontal magnification" is not a misalignment. Just for showing the symptoms clearly.

B. Overview of the color registration control

In the color registration control, the color registration marks of each color are formed on the transfer belt (outside of the largest paper area). The color registration sensors; /Fr (PS8) and /Rr (PS9) detect the marks to know how much they are shifted from each other. If the shift amount falls outside the prescribed range, the image write timing, the clock frequency and the angle of the CY2 lens 2 for the corresponding color are adjusted as necessary.

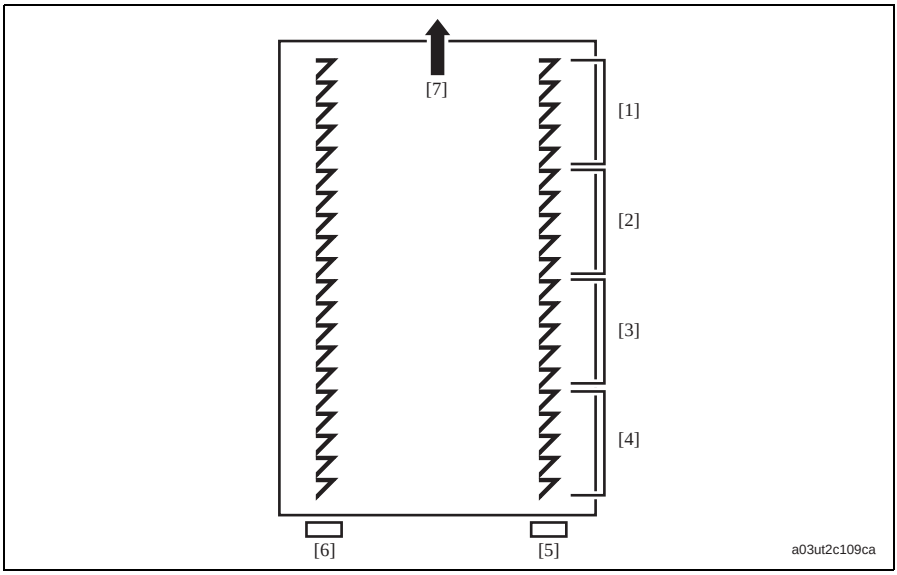


[1] Drum /Y
[2] Write unit /Y
[3] Drum /M
[4] Write unit /M
[5] Drum /C
[6] Write unit /C
[7] Drum /K
[8] Write unit /K
[9] Transfer belt
[10] Transferring direction
[11] Color registration sensor /Fr (PS8)
[12] Color registration sensor /Rr (PS9)
[13] Data processing

C. Procedure for the color registration control operation

1. Transferring the color registration mark

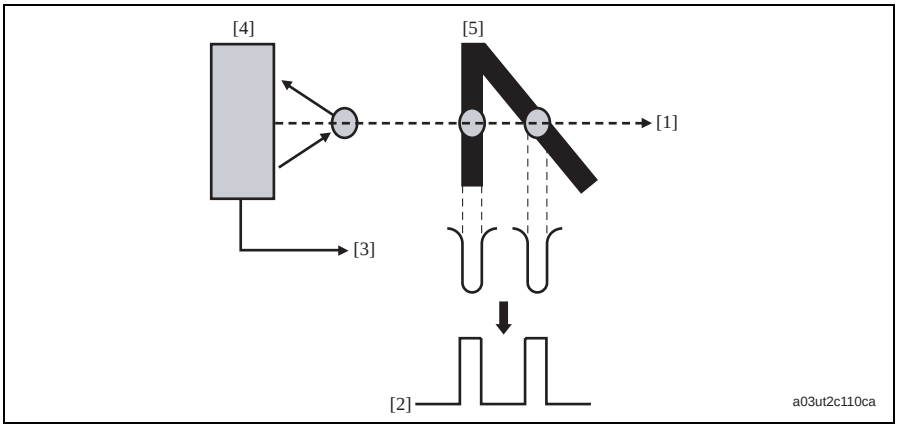
The color registration mark "ㄱ" of each black, cyan, magenta, and yellow colors are transferred on the transfer belt in that order forming two marks per line, one each on the left and right sides on the belt. The left and right positions of the marks on the belt correspond to the positions of the color registration sensors; /Rr (PS9) and /Fr (PS8).



[1] Color registration mark /K
[2] Color registration mark /C
[3] Color registration mark /M
[4] Color registration mark /Y
[5] Color registration sensor /Fr (PS8)
[6] Color registration sensor /Rr (PS9)
[7] Transferring direction

2. Detecting the color registration marks

The PS8 and PS9 detect the edges of the color registration mark "ㄱ" of each color and convert the detected result into digital signals. The edge detection is performed at four points (edges) per mark.



[1] Detecting direction (transferring direction)

[2] Binarized digital signals

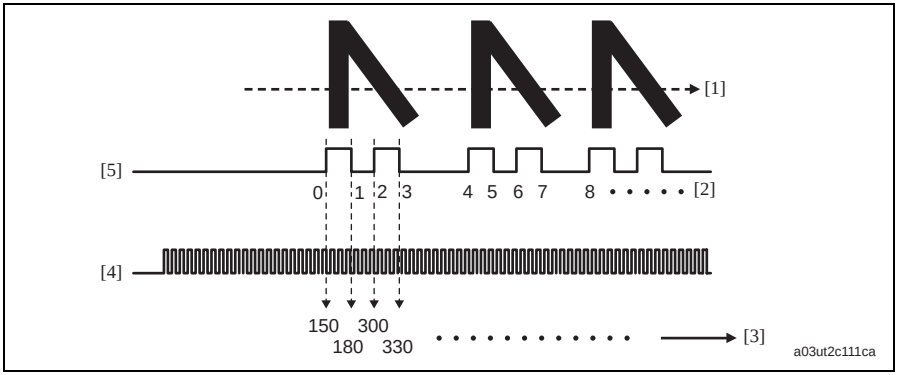
[3] Detection signal of the color registration sensors /Fr and /Rr (PS8 and PS9) (analog signal)

[4] Color registration sensor /Fr and /Rr (PS8 and PS9)

[5] Color registration mark

3. Calculating and correcting the color drift amount

The interval between the detection of one edge of the registration mark and the next edge with the PS8 and PS9 sensors are recorded. As shown below, each time interval between the edge detections is determined with the counts of clock signal, and the counts with the PS8 and those with the PS9 are recorded separately.



[1] Detecting direction (transferring direction)

[2] Address number of the detected edge

[3] Counts of clock signal corresponding to the address for each detected edge

[4] Clock signal

[5] Binarized digital signals

The recorded time intervals for cyan, magenta, yellow colors are compared with those for black color, and the differences are determined as color drift amounts. In addition to that, the difference between the PS8 and PS9 time intervals of black color is compared with those of the other colors in order to determine color drift amounts caused by tilt of write units. According to the obtained drift amounts, the registration control is performed.

D. Operation condition of the color registration control

The color registration control is performed when:

- Operation condition 1
  The color registration automatic correction is executed in the service mode.
  Be sure to perform the above operation when replacing components listed in "9. LIST OF ADJUSTMENT ITEMS" in Field Service manual.
- Operation condition 2
  During warm-up. However, it is not performed if 70 degrees C or higher of fusing temperature is detected when starting the warm-up.
- Operation condition 3
  The prescribed number of pages are copied/printed.
- Operation condition 4
  A copy/print job is received after the specified time passed.
- Operation condition 5
  Changes in temperature detected by the temperature detection board (TDB) fall outside the prescribed range. The control is performed when a copy/print job is received first time after the status occurs.

NOTE

- **In case of the Operation condition 3, the registration control is performed interrupting the copy/print job. This can be changed with DIPSW in service mode to carry out the control after finishing a copy/print job.**
- **In case of the Operation condition 4 and 5, the color registration correction control is performed at the beginning of the first copy/print after unity of the operating condition.**

8.2.4 Front/back sides skew correction in main scan direction

- If a black image written by the write unit /K is skewed in the main scan direction when performing duplex printing, black images finally printed on front and back sides of paper will be skewed in opposite way.
- The inclination of the CY2 lens2 of the write unit /K should be adjusted in order to correct the skew.
- The adjustment can be made manually using the following menus.
  User's mode: chart adjustment
  Service mode: CD skew adjustment

8.2.5 Back side magnification adjustment in sub scan direction

- When the back side mag. adjustment is enabled with the utility, the adjustment is carried out by changing the number of revolutions of the polygon motor.
- In order to reduce magnification rate in sub scan direction, the number of revolutions of the polygon motor increases lowering the clock rate.
- The magnification reduction rate can be set manually using the following menus.
  User's mode: chart adjustment
  Service mode: FD mag. adjustment

8.2.6 Image stabilization control

To achieve stable image quality, the following controls are provided. Refer to "23. IMAGE STABILIZATION CONTROL" for details.
(See P.110)

- MPC (maximum power control)
- APC (automatic power control)
- Vm adjustment control
- Color registration control

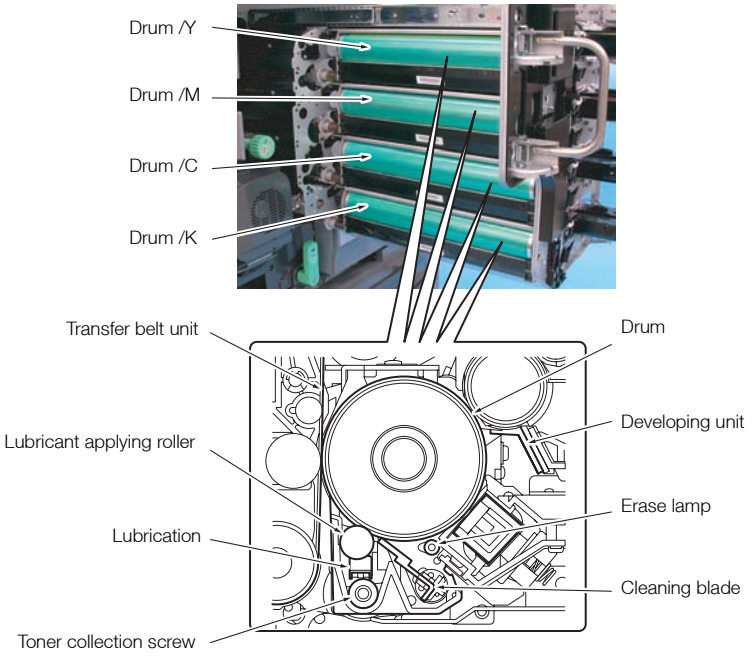
8.2.7 Image processing

For the image processing, the following items are provided. Refer to "24. IMAGE PROCESSING" for details.
(See P.117)

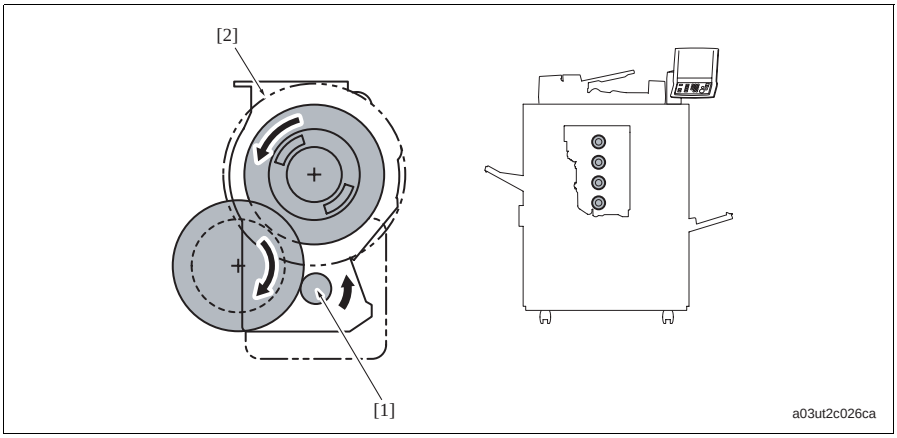
- Rotation/Expansion
- 2dotPWM
- PWM
- Frequency conversion

9. PHOTOCONDUCTOR SECTION

9.1 Configuration



9.2 Drive



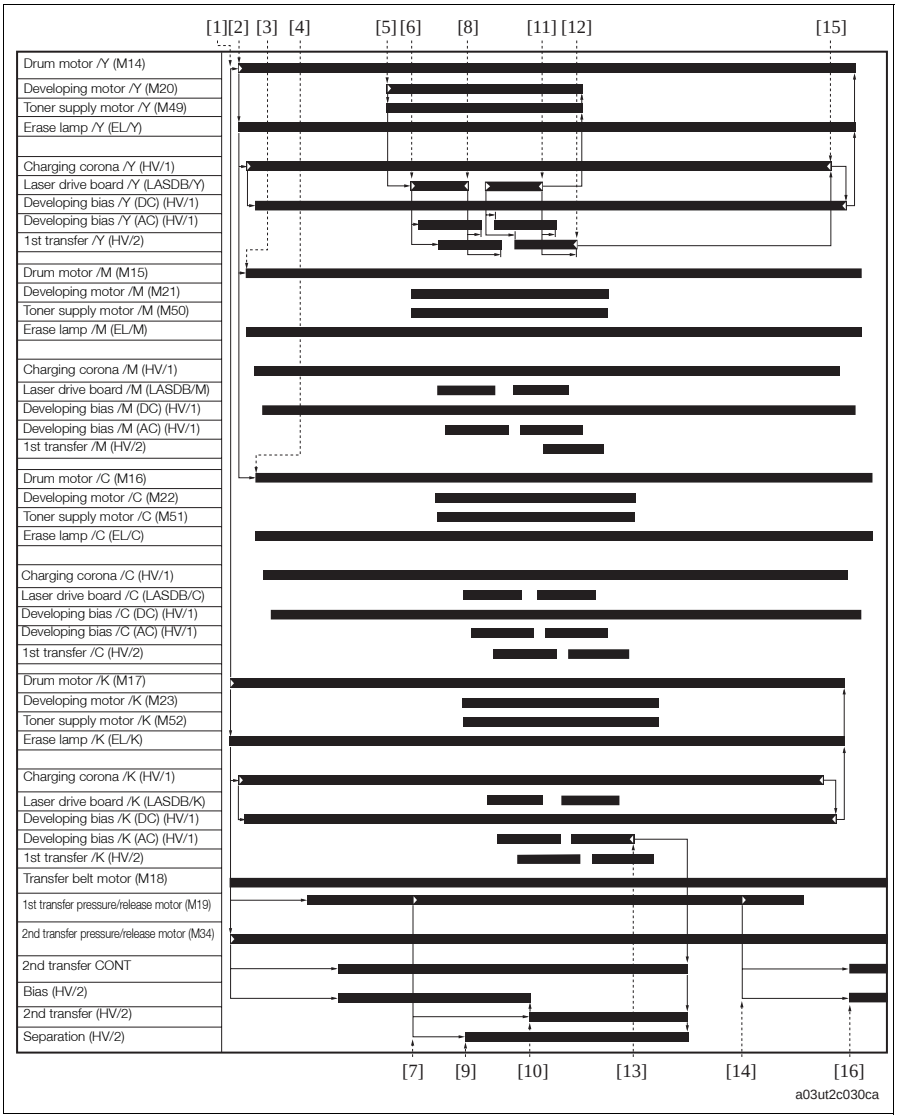
[1] Drum motor /Y (M14), /M (M15), /C (M16) and /K (M17)

[2] Drum

9.3 Operation

9.3.1 Image creation control

- The image creation process starts when the drum motor /K (M17) turns on [1], though transferring each color toner image to the transfer belt is made in the order of yellow, magenta, cyan, and black.
- After M17 turns on, the other drum motors are turned on in the order of motor /Y (M14) [2], /M (M15) [3] and /C (M16) [4].
- The erase lamp, charging corona and developing bias of each color turns on when the corresponding drum motor starts to rotate.
- The developing motor starts to rotate [5] after the specified time passed from the start of the writing operation [6].
- The on [6] and off [8] of writing operation corresponds to the on and off of the developing bias (AC) and the first transfer.
- The developing motor and the toner supply motor stop and the writing operation is finished [11].
- The charging corona is deenergized and the first transfer is finished. [12].
- When the turning corona turns off [15], the DC bias supply, the erase lamp and the drum motor are stopped. This is the end of Y toner image creating process.
- Creating toner images of the other colors is performed subsequently.
- The first transfer pressure/release motor (M119) and the second transfer pressure/release motor (M34) turn on while creating the toner images on each drum.
- When the transfer belt is moved to the first transfer position by the M19, the V_TOP signal which triggers the second transfer is output [7].
- The toner images on each drum are transferred to the transfer belt one by one (first transfer).
- The separation (HV/2) turns on [9] after the specified time passed from when the V_TOP signal is output.
- After the specified time passed from when the separation (HV/2) turns on, the second transfer (HV/2) turns on [10] to transfer the complete toner image on the belt to paper (second transfer). The bias supply is stopped [10] and second transfer cleaning is canceled.
- The second transfer operation is terminated after the specified time passed from when supplying the developing AC bias for black is stopped [13].
- After the specified time passed from when M19 stops applying pressure [14] against the transfer belt, the bias is applied [16] and second transfer cleaning is performed.


[1][2] [3] [4] [5] [6] [8] [11] [12] [15]
Drum motor /Y (M14)
Developing motor /Y (M20)
Toner supply motor /Y (M49)
Erase lamp /Y (EL/Y)
Charging corona /Y (HV/1)
Laser drive board /Y (LASDB/Y)
Developing bias /Y (DC) (HV/1)
Developing bias /Y (AC) (HV/1)
1st transfer /Y (HV/2)
Drum motor /M (M15)
Developing motor /M (M21)
Toner supply motor /M (M50)
Erase lamp /M (EL/M)
Charging corona /M (HV/1)
Laser drive board /M (LASDB/M)
Developing bias /M (DC) (HV/1)
Developing bias /M (AC) (HV/1)
1st transfer /M (HV/2)
Drum motor /C (M16)
Developing motor /C (M22)
Toner supply motor /C (M51)
Erase lamp /C (EL/C)
Charging corona /C (HV/1)
Laser drive board /C (LASDB/C)
Developing bias /C (DC) (HV/1)
Developing bias /C (AC) (HV/1)
1st transfer /C (HV/2)
Drum motor /K (M17)
Developing motor /K (M23)
Toner supply motor /K (M52)
Erase lamp /K (EL/K)
Charging corona /K (HV/1)
Laser drive board /K (LASDB/K)
Developing bias /K (DC) (HV/1)
Developing bias /K (AC) (HV/1)
1st transfer /K (HV/2)
Transfer belt motor (M18)
1st transfer pressure/release motor (M19)
2nd transfer pressure/release motor (M34)
2nd transfer CONT
Bias (HV/2)
2nd transfer (HV/2)
Separation (HV/2)
[7] [9] [10] [13] [14] [16]
a03ut2c030ca

[1] M17 ON

[2] M14 ON

[3] M15 ON

[4] M16 ON

[5] M20 ON

[6] Start of writing (First toner image)

[7] V_TOP signal generation

[8] Finish of writing (First toner image)

[9] Separation ON

[10] Start of second transfer

[11] Finish of writing (The last toner image)

[12] Finish of first transfer /Y

[13] Developing bias /K (AC) OFF (End of writing)

[14] Start of transfer belt release

[15] Charging corona /Y OFF

[16] Start of second transfer cleaning

9.3.2 Erase lamp (EL) control

A. Purposes

- To eliminate remained electric potential on the drum surface
- To distribute the electric potential uniformly on the drum surface
- To light when the drum is in the position before charging

B. Execution timing

- Turns on/off synchronously with each drum motor.

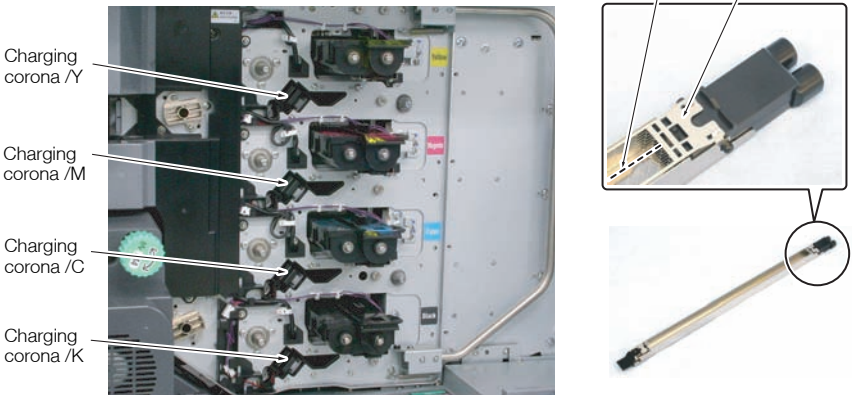
9.3.3 Image stabilization control

To achieve stable image quality, the following controls are provided. Refer to "23. IMAGE STABILIZATION CONTROL" for details.(See P.110)

- Drum rotation control
- Vm adjustment control

10. CHARGING SECTION

10.1 Configuration



10.2 Operation

10.2.1 Charging control

A. Charging wire

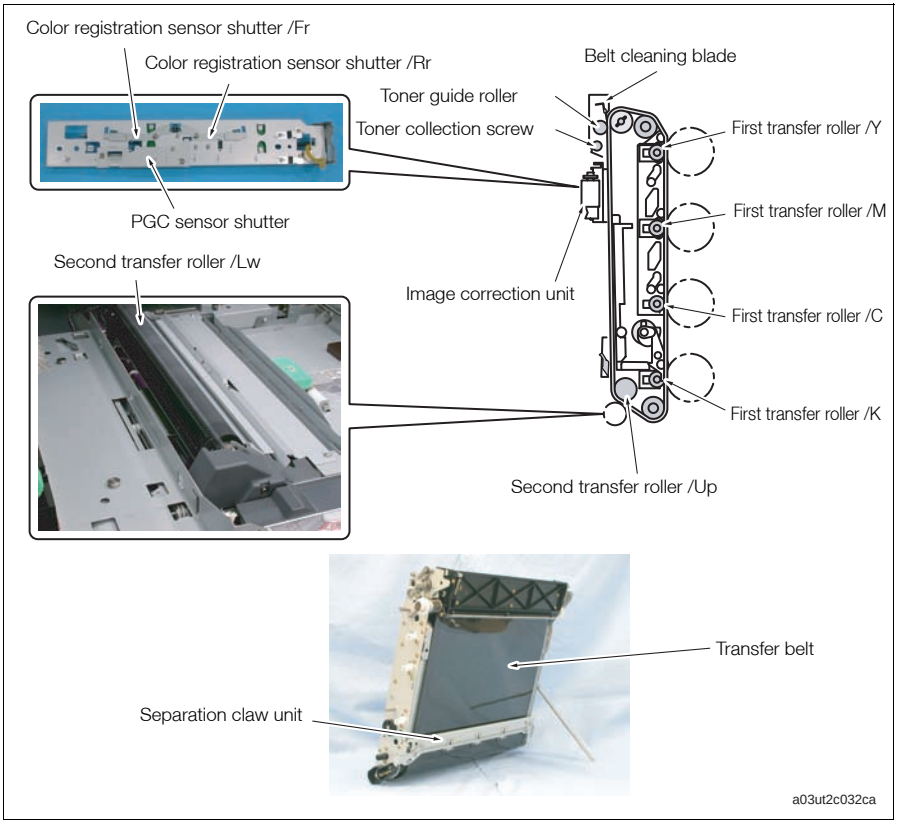
- The high voltage unit /1 (HV/1) boosts 24 VDC and apply a negative DC voltage to the charging wire. The wire discharges the negative voltage.
- Charging output range: -450 to -1,100 μA

B. Charging grid

- To let the charging wire discharge stably, a negative high voltage is applied to the charging grid from the high voltage unit /1 (HV/1).
- Charging grid output range: -250 to -1,000V

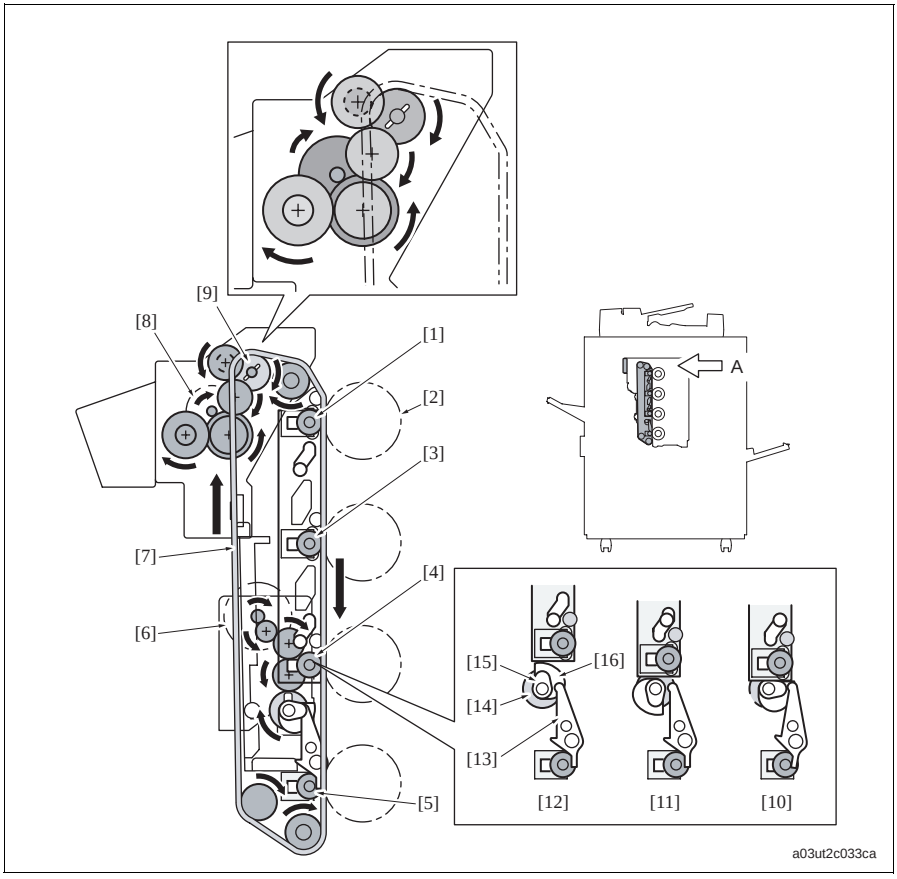
11. INTERMIDIATE TRANSFER SECTION

11.1 Configuration



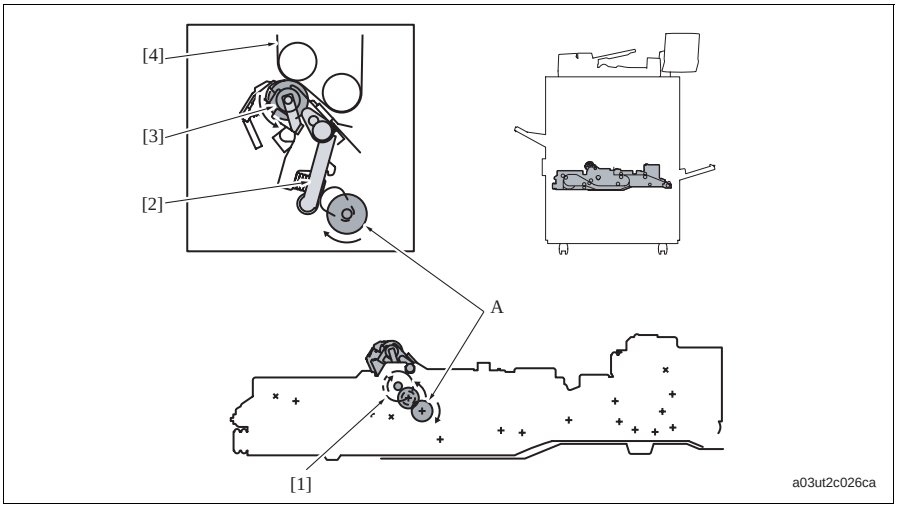
11.2 Drive

11.2.1 Transfer belt conveyance/pressure drive



[1] First transfer roller /Y
[2] Drum
[3] First transfer roller /M
[4] First transfer roller /C
[5] First transfer roller /K
[6] First transfer pressure/release motor (M19)
[7] Transfer belt
[8] Transfer belt motor (M18)
[9] Belt driving roller
[10] Standby (all released)
[11] Black-and-white mode (Only first transfer rollers /K is pressed)
[12] Full color mode (all pressed)
[13] First transfer roller /K pressure release arm
[14] Drive coupling
[15] First transfer roller /K pressure release cam
[16] First transfer rollers /Y /M /C pressure release cam

11.2.2 Second transfer pressure/release drive



[1] Second transfer pressure/release motor (M34)

[2] Pressure arm

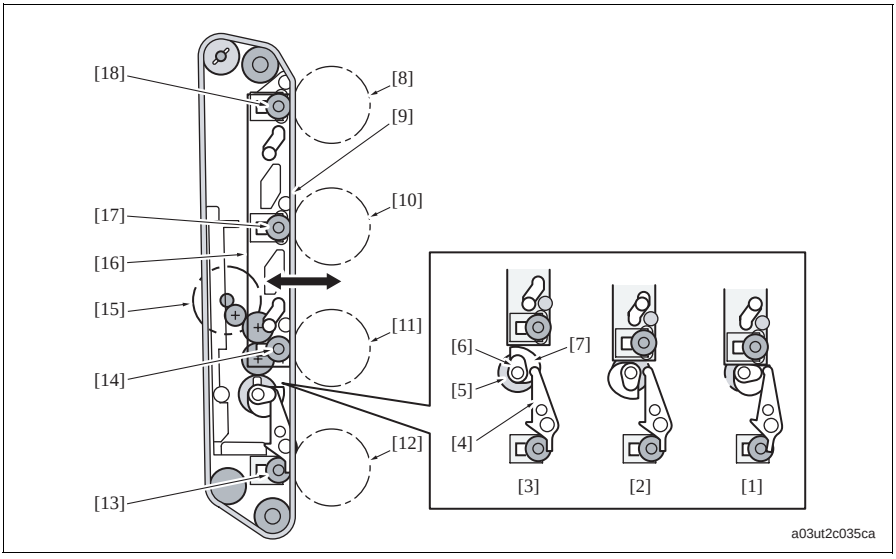
[3] Second transfer roller /Lw

[4] Transfer belt

11.3 Operation

11.3.1 First transfer roller pressure/release mechanism

- During first transfer, the transfer belt [9] is pressed against and released from the drums /Y [8], /M [10], /C [11] and /K [12].
- The three first transfer rollers /Y [18], /M [17] and /C [14] are included in the color first transfer roller assy [16] and driven simultaneously.
- The color first transfer roller assy drives the first transfer pressure/release motor (M19) [15] via the first transfer roller /C pressure release cam [7].
- The first transfer roller /K [13] drives the M19 via the first transfer roller /K pressure release arm [4] and the first transfer roller /K pressure release cam [6].
- The two cams rotate synchronously. The difference in shape between the two cams enables to move the color first transfer roller assy between the three positions according to the print mode.
- In full color mode, the both color first transfer roller assy and the first transfer roller /K are pressed [3].
- In black-and-white mode, only the first transfer roller /K is pressed.
- The rotating position of the cam is detected by the first transfer HP sensor (PS15).
- The rotation amount of the cam is controlled by the drive force of the M19 that starts to rotate when the PS15 turns off.



[1] In standby mode
[2] In black-and-white mode
[3] In full color mode
[4] First transfer roller /K pressure release arm
[5] Drive coupling
[6] First transfer roller /K pressure release arm
[7] First transfer roller /C pressure release cam
[8] Drum /Y
[9] Transfer belt
[10] Drum /M
[11] Drum /C
[12] Drum /K
[13] First transfer roller /K
[14] First transfer roller /C
[15] First transfer pressure/release motor (M19)
[16] Color First transfer roller assy
[17] First transfer roller /M
[18] First transfer roller /Y

11.3.2 First transfer control

A. First transfer operation

- Toner on the drum is transferred onto the transfer belt by a DC bias applied to the first transfer roller that presses the transfer belt from its inside.

B. First transfer roller DC bias

The DC bias for the first transfer roller changes depending on the following conditions:

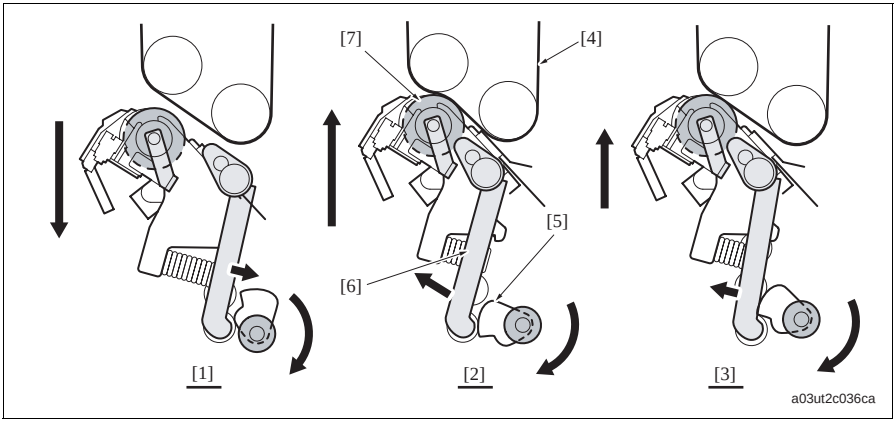
- Process speed
- Black-and-white mode or color mode
- Humidity
- Count of uses of the first transfer roller
- Count of uses of the developer

C. Operation timing

Refer to "9.3.1 Image creation control"
(See P.43)

11.3.3 Second transfer mechanism

- The cam [5] is rotated by the second transfer pressure/release motor (M34).
- When the cam pushes the pressure arm [6], the second transfer roller /Lw [7] is pushed up and pressed to the transfer belt unit [4].
- Pressure can be selected from "Normal [2]" or "Low [3]". (If the image failure (transfer failure) occurs when printing onto thick papers, select "Low".)
- Pressure can also be selected from the paper setting in the basic screen by setting "1" for DipSW1-0.
- When the cam further rotates, the pressure to the pressure arm is released and the second transfer roller /Lw comes down to be released from the transfer belt unit [1].



[1] Released
[2] Pressed (Normal)
[3] Pressed (Low)
[4] Transfer belt unit
[5] Cam
[6] Pressure arm
[7] Second transfer roller /Lw

11.3.4 Second transfer control

A. Second transfer operation

- The toner on the transfer belt is transferred onto paper when the paper is conveyed in between the transfer belt and the second transfer roller /Lw.

B. Second transfer roller /Up DC bias

The DC bias for the second transfer roller changes depending on the following conditions:

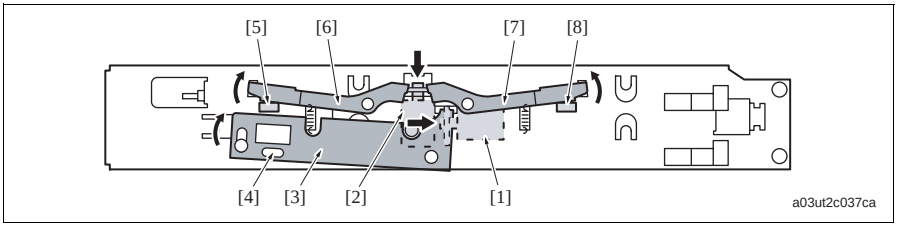
- Process speed
- Black-and-white mode or color mode
- Humidity
- Type of paper
- Front side or back side of paper

C. Operation timing

Refer to "9.3.1 Image creation control".
(See P.43)

11.3.5 Image correction unit shutter mechanism

- The image correction unit is provided with a shutter mechanism that covers the sensors while they are not used to prevent them from contamination.
- The color registration sensor shutter /Fr [6] and /Rr [7] are driven by the color registration shutter solenoid (SD2) [2] in order to protect the color registration sensor /Fr (PS8) [5] and /Rr (PS9) [8].
- The PGC sensor shutter [3] that protects the PGC sensor [4] is driven by the PGC shutter solenoid (SD3) [1].



[1] SD3
[2] SD2
[3] PGC sensor shutter
[4] PGC sensor
[5] PS8
[6] Color registration sensor shutter /Fr
[7] Color registration sensor shutter /Rr
[8] PS9

11.3.6 Control of flip prevention for the belt cleaning blade

- As countermeasures against the flip of the belt cleaning blade and the occurrence of white bands on images, a toner band is periodically created on the transfer belt.
- Creating the toner band can be enabled/disabled with DipSW20-4.

11.3.7 Control against belt filming

- Lubricant contained in the toner adheres to the transfer belt, and can cause white bands on images.
- Therefore, toner is stored between the belt cleaning blade and the toner guide roller to scrape the lubricant off the belt surface with the toner at regular intervals.

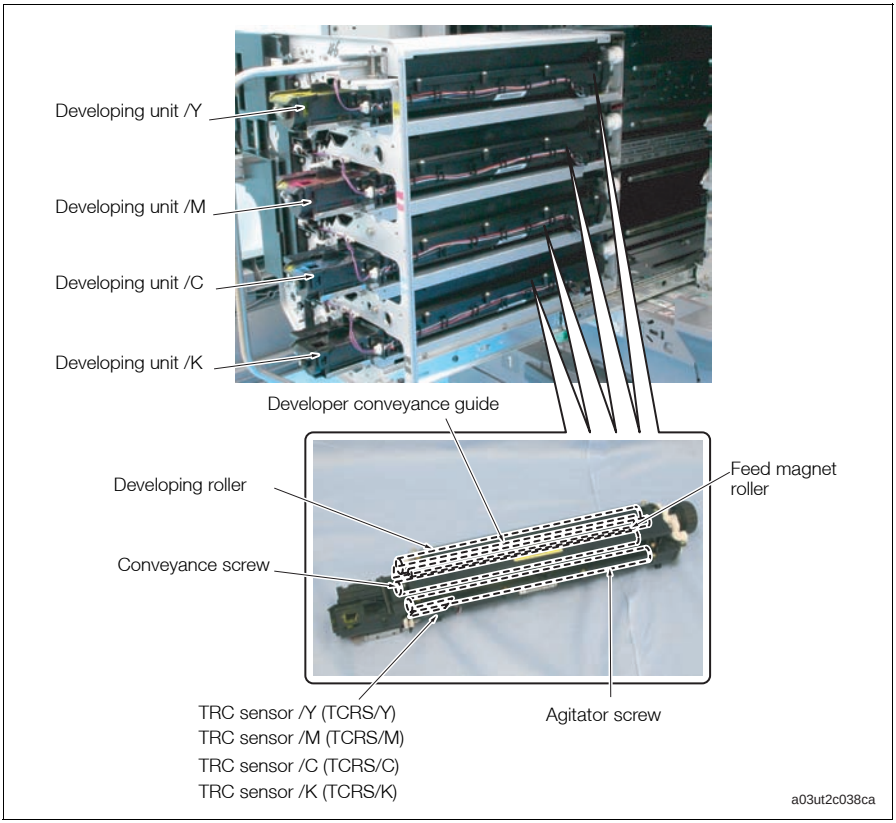
11.3.8 Image stabilization control

To achieve stable image quality, the following controls are provided. Refer to "23. IMAGE STABILIZATION CONTROL" for details.(See P.110)

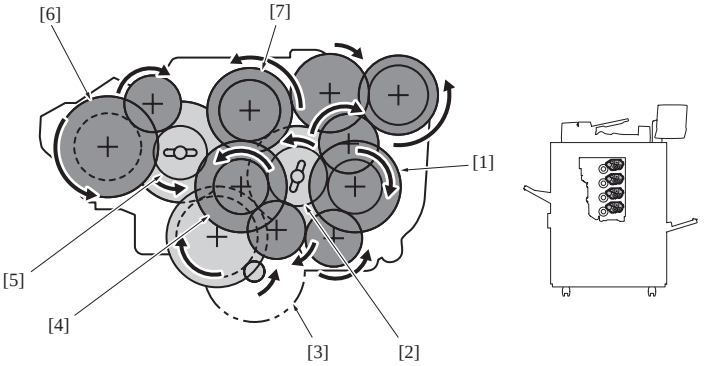
- Color registration control

12. DEVELOPING SECTION

12.1 Configuration



12.2 Drive

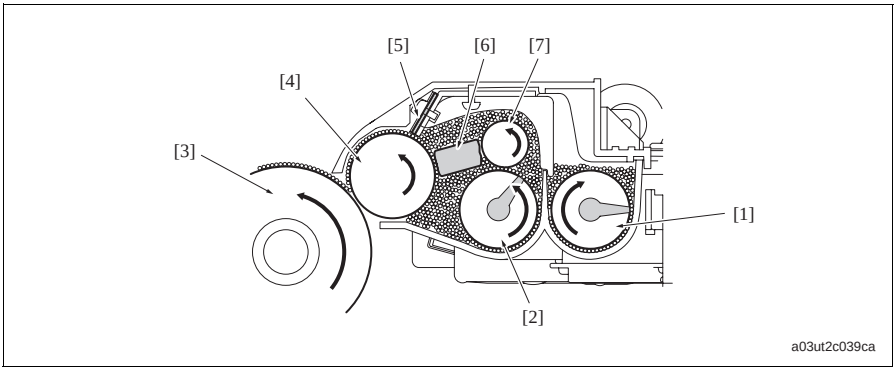


[1] Agitator screw
[2] Developing coupling /2
[3] Developing motor /Y (M20), /M (M21), /C (M22), /K (M23)
[4] Conveyance screw
[5] Developing coupling /1
[6] Developing roller
[7] Feed roller

12.3 Operation

12.3.1 Developer conveyance

- The developer in the developing unit is agitated by the agitator screw [1] and conveyed to the conveyance screw [2].
- The developer around the conveyance screw is conveyed to the developing roller [4] by the feed roller [7] and the developer conveyance guide [6].
- The developer on the developing roller is spread uniformly by the developing regulation plate [5].
- After transfering the developer onto the drum [3], the remained developer on the developing roller is sent back to the conveyance screw and the agitator screw.



[1] Agitator screw
[2] Conveyance screw
[3] Drum
[4] Developing roller
[5] Developing regulation plate
[6] Developer conveyance guide
[7] Feed roller

12.3.2 Developing bias control

A. Purpose

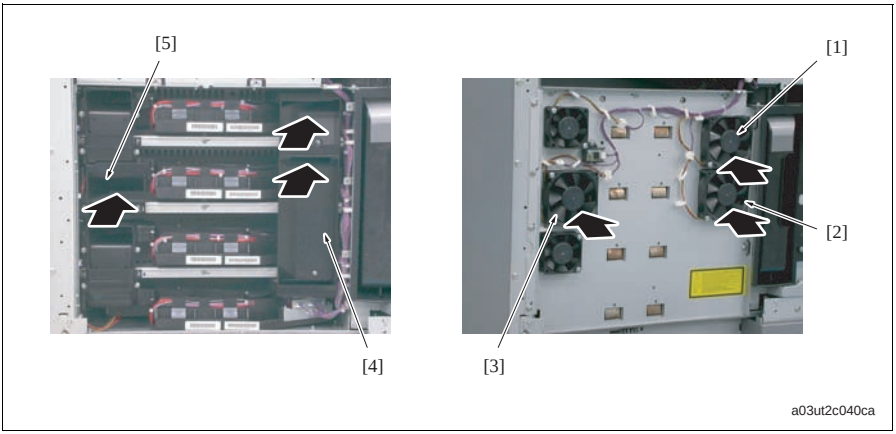
- The developing bias is applied to the developing roller in order to attract toner to the drum surface.

B. Timing

- Refer to "9.3.1 Image creation control". (See P.43)

12.3.3 Developing suction control

- The machine intakes the external air to effectively cool down the heat around the developing unit.
- The developing fans /1 (M45) [1] and /2 (M46) [2] are provided to cool down the rear of the developing unit. The fresh-air brought by the M45 and M46 is sent to the rear of the developing unit via the duct [4].
- The developing fan /3 (M64) [3] is provided to cool down the heat around the front side of the developing unit. The fresh-air brought by the M64 is sent to the front of the developing unit via the duct [5].



[1] M45
[2] M46
[3] M64
[4] Duct
[5] Duct

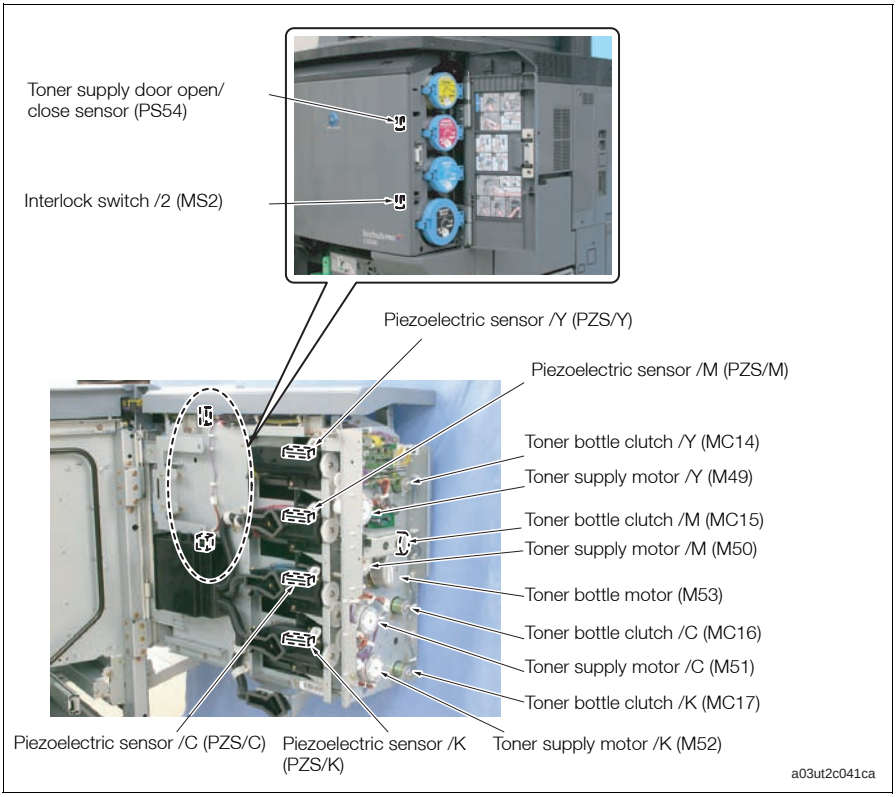
12.3.4 Image stabilization control

To achieve stable image quality, the following controls are provided. Refer to "23. IMAGE STABILIZATION CONTROL" for details.
(See P.110)

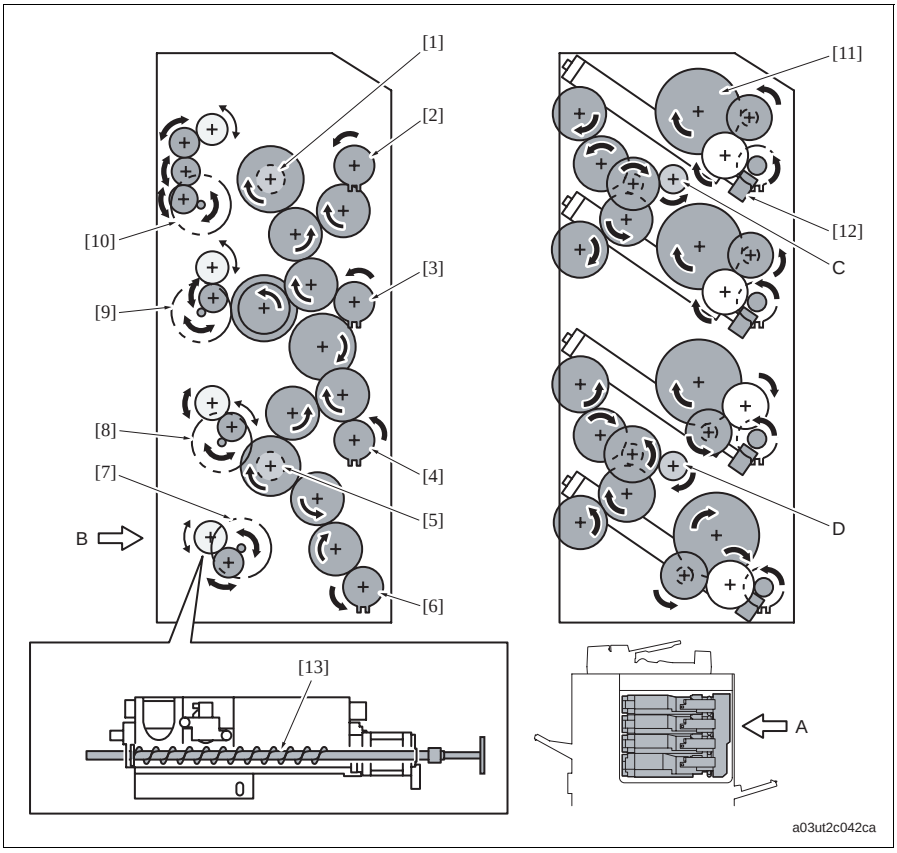
- Toner density control

13. TONER SUPPLY SECTION

13.1 Configuration


Toner supply door open/ close sensor (PS54)
Interlock switch /2 (MS2)
Piezoelectric sensor /Y (PZS/Y)
Piezoelectric sensor /M (PZS/M)
Toner bottle clutch /Y (MC14)
Toner supply motor /Y (M49)
Toner bottle clutch /M (MC15)
Toner supply motor /M (M50)
Toner bottle motor (M53)
Toner bottle clutch /C (MC16)
Toner supply motor /C (M51)
Toner bottle clutch /K (MC17)
Piezoelectric sensor /C (PZS/C)
Piezoelectric sensor /K (PZS/K)
Toner supply motor /K (M52)
a03ut2c041ca

13.2 Drive



[1] Toner supply gear /A (same shaft as C)
[2] Toner bottle clutch /Y (MC14)
[3] Toner bottle clutch /M (MC15)
[4] Toner bottle clutch /C (MC16)
[5] Toner supply gear /A (same shaft as D)
[6] Toner bottle clutch /K (MC17)
[7] Toner supply motor /K (M52)
[8] Toner supply motor /C (M51)
[9] Toner bottle motor (M53)
[10] Toner supply motor /M (M50)
[11] Toner supply motor /Y (M49)
[12] Toner bottle drive gear
[13] Toner conveyance screw
[14] Toner supply screw

13.3 Operation

13.3.1 Toner conveyance control

A. Toner supply control to the toner hopper

- When toner level in the toner hopper becomes about 50g, the bottle motor (M53) and the toner bottle clutch /Y (MC14), /M (MC15), /C (MC16) and /K (M52) are turned on. Then the toner bottle rotates to supply new toner.

B. Toner supply control to the developing unit

(1) When the power is turned on

- Each of the TCR sensors /Y (TCRS/Y), /M (TCRS/M), /C (TCRS/C) and /K (TCRS/K) detects the toner density in each developing unit after the specified time passed from when the sub power switch (SW2) turns on.
- When the detected density is below the reference toner density that is stored in the CPU on the printer control board (PRCB), the toner supply motors /Y (M49), /M (M50), /C (M51) and /K (M52) are turned on to supply toner up to the specified density.

(2) While in printing

- While in the print operation, each of the TCRS /Y, /M, /C and /K monitors the toner density.
- When output voltage of the TCRS /Y, /M, /C and /K is below the reference value, the toner supply motors are turned on to supply toner up to the specified density.

13.3.2 Remaining toner detection control

A. Remaining toner detection control

- Toner levels in each toner hopper are detected by the piezoelectric sensors /Y (PZS/Y), /M (PZS/M), /C (PZS/C) and /K (PZS/K).

B. Detection timing

- During printing (always on)

C. No-toner display on the operation panel

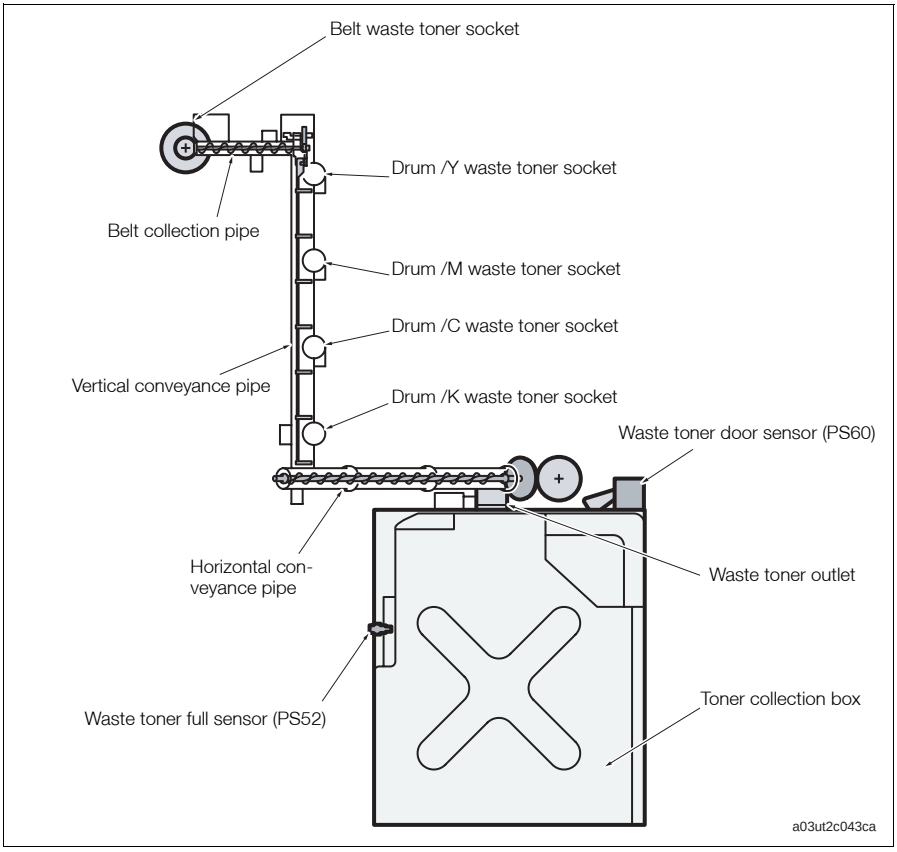
- When the value output from the piezoelectric sensor still indicates the "no-toner" status even after the toner is supplied to the toner hopper, it is judged that the toner bottle has run out of toner and the message "Please replace toner bottle" is displayed on the touch panel.

13.3.3 Stop control for print operation with no toner

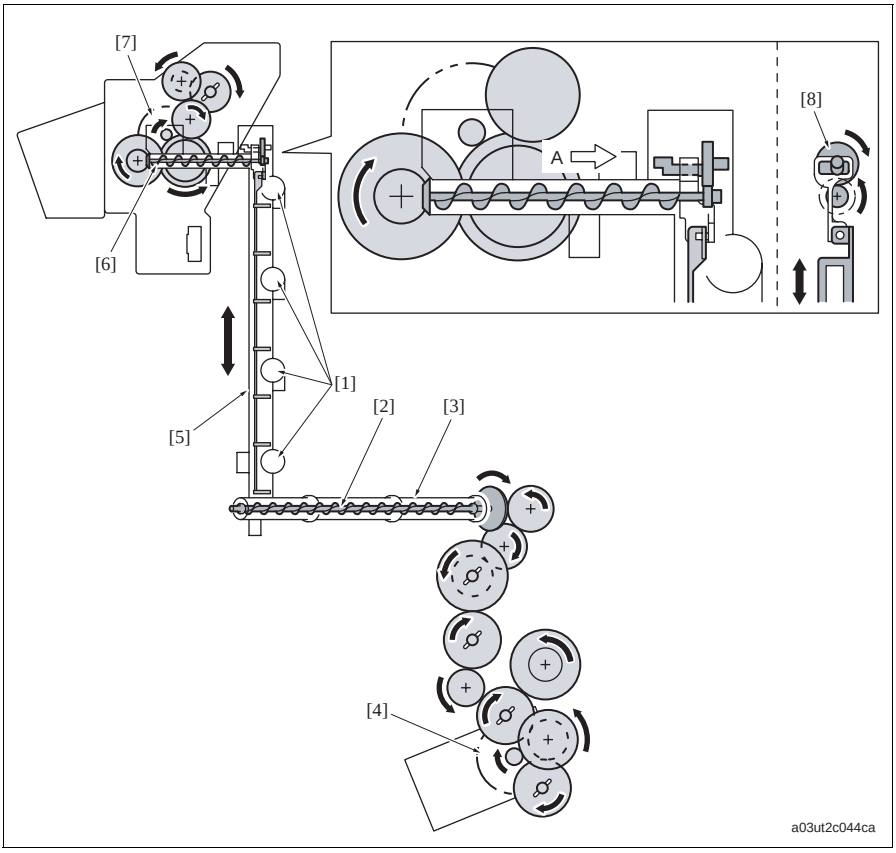
- After the message "Please replace toner bottle" is displayed on the touch panel, the consumption of the remaining toner (about 50g) in the toner hopper is detected by the driving time of the toner supply motors /Y (M49), /M (M50), /C (M51) and /K (M52).
- When it is detected that the remaining toner has been consumed, the print operation is stopped by the settings of DIPSW1-2 and 1-3.
- When toner density in the developing unit becomes below the reference value while in the printing stop operation described above, print operation is immediately stopped after exiting the paper in progress.

14. TONER COLLECTION SECTION

14.1 Configuration



14.2 Drive



[1] Drum waste toner inlet
[2] Horizontal conveyance screw
[3] Horizontal conveyance pipe
[4] Paper feed motor (M41)
[5] Vertical conveyance pipe
[6] Belt collection screw
[7] Transfer belt motor (M18)
[8] Belt collection cam

14.3 Operation

14.3.1 Toner collection control

- Toner collection section is driven by the transfer belt motor (M18) and the paper feed motor (M41).
- Collecting toner is performed by the M18 that drives the transfer belt and the paper feed operation driven by the M41.

14.3.2 Toner collection box control

- The presence of toner collection box is detected by on/off of the waste toner door sensor (PS60).

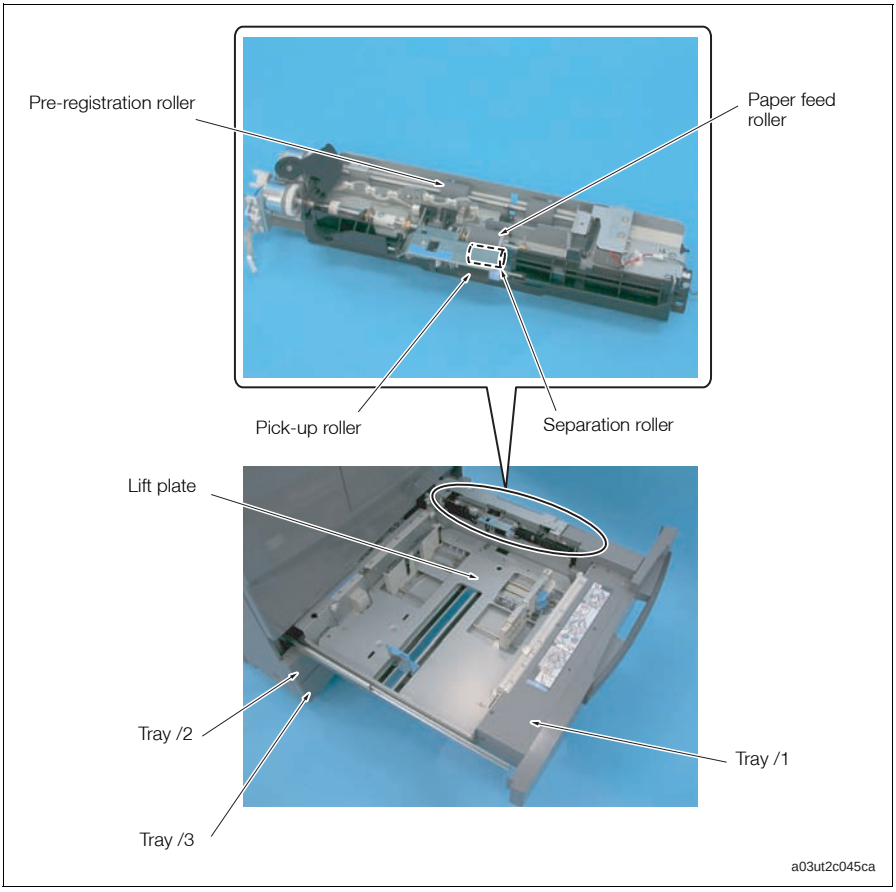
14.3.3 Box full control

- When the waste toner full sensor (PS52) is turned on, a warning message is displayed on the touch panel.
- There is a box full counter in the NVRAM board (NRB). After the PS 52 is turned on, the counter starts counting.
- For operation details, refer to the table blow.

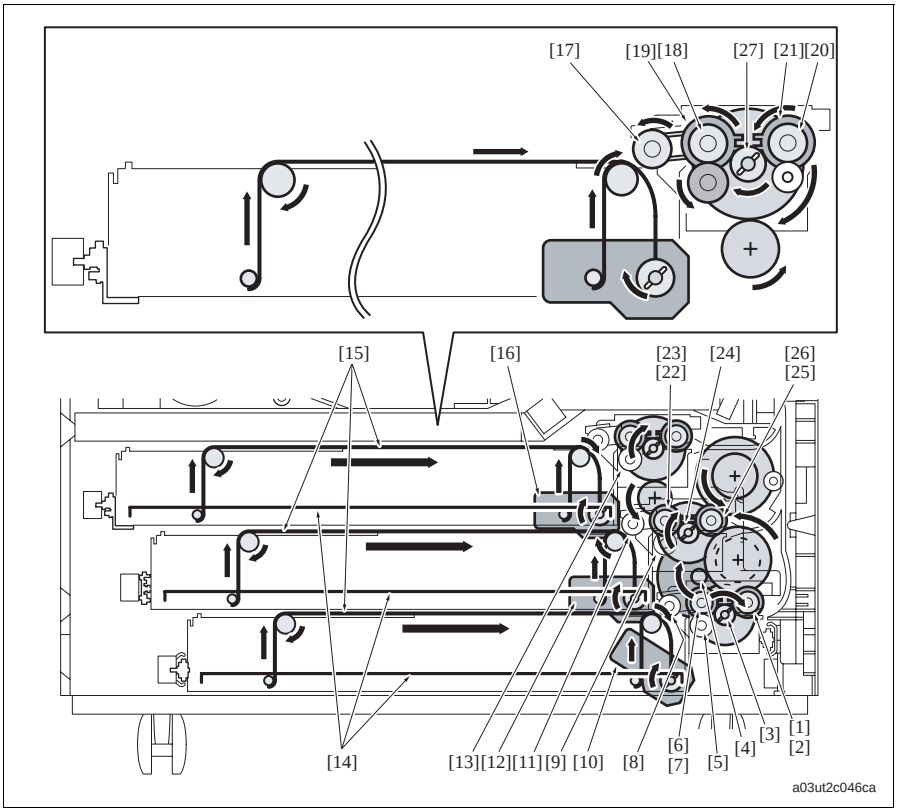
PS60	PS52	Box full counter	Operation
ON	OFF	—	Print available
ON	ON	Less than 2500	• Warning message is displayed on the touch panel when the PS52 turns on. • After the PS52 turns on, printing is available unless the count exceeds 2500.
ON	ON	2500 or more	• Rejects incoming new jobs • Job in progress is continued 3000 is counted. • Print stopped at 3000 counts

15. PAPER FEED SECTION

15.1 Configuration



15.2 Drive



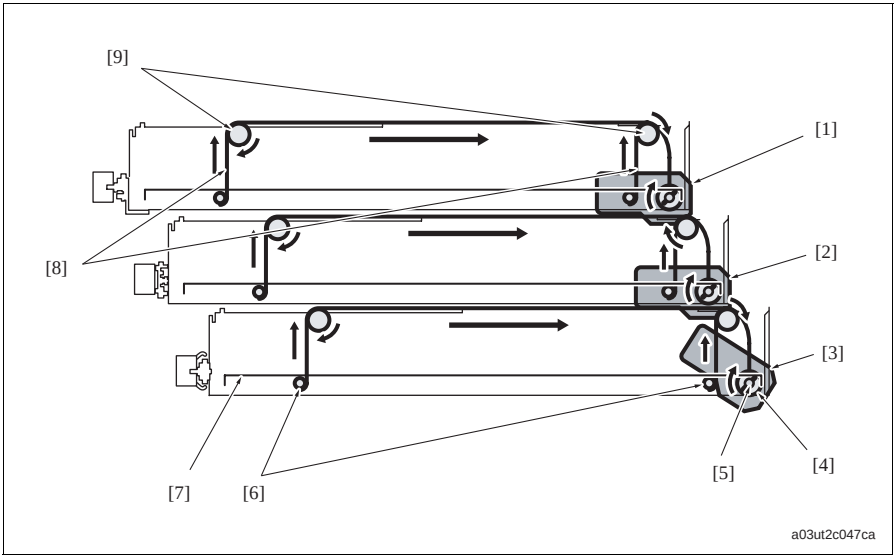
[1] Pre-registration roller /3
[2] Pre-registration clutch /3 (MC12)
[3] Drive coupling /3
[4] Paper feed motor (M41)
[5] Separation roller /3
[6] Paper feed roller /3
[7] Paper feed clutch /3 (MC11)
[8] Pick-up roller
[9] Separation roller /2
[10] Paper lift motor /3 (M40)
[11] Pick-up roller /2
[12] Paper lift motor /2 (M39)
[13] Separation roller /1
[14] Lift plate
[15] Lift wire
[16] Paper lift motor /1 (M38)
[17] Pick-up roller /1
[18] Paper feed roller /1
[19] Paper feed clutch /1 (MC7)
[20] Pre-registration roller /1
[21] Pre-registration clutch /1 (MC8)
[22] Paper feed roller /2
[23] Paper feed clutch /2 (MC9)
[24] Drive coupling /2
[25] Pre-registration roller /2
[26] Pre-registration clutch /2 (MC10)
[27] Drive coupling /1

15.3 Operation

15.3.1 Plate up/down control

A. Plate-up operation

- The lift plate [7] lies on the both left and right shaft [6].
- The lift wires [8] are connected to each shaft and the plate is kept in a horizontal position by the drive pulley [4], one for each of the lift drive shaft [5] via each pulley [9].
- When the each lift drive shaft of the trays are rotated by the paper lift motors /1 (M38) [1], /2 (M39) [2] and /3 (M40) [3], the each drive pulley winds up the wire and then the lift plate goes up.



[1] M38
[2] M39
[3] M40
[4] Drive pulley
[5] Lift drive shaft
[6] Shaft
[7] Lift plate
[8] Lift wires
[9] Pulleys

B. Plate-down operation

- When each tray is pulled out, the each lift drive shaft is disengaged from the couplings of the lift motors /1 (M38), /2 (M39), /3 (M40).
- The disengagement cuts off the drive force from the M38, M39 and M40 to the lift plate, and the plate goes down by its own weight.

C. Operation timing

- When the tray is set, the paper lift motors /1 (M38), /2 (M39), and /3 (M40) start to rotate and the lift plate goes up.
- When the upper limit sensors /1 (PS30), /2 (PS36) and /3 (PS42) are turned on by the top sheet, the M38, M39 and the M40 stop.
- When the PS30, PS36 and PS42 are turned off by paper feeding, the M38, M39 and M40 rotate again, to lift the lift plate until each upper limit sensor turns on.

15.3.2 Paper size detection control

A. Detection in main scanning direction

- Paper size in main scanning direction is detected by the resistance value of the paper size VR/1 (VR1), /2 (VR2) and /3 (VR3).
- The resistance value of the VR1, VR2, and VR3 varies depending on the position of the guide plate.

B. Detection in sub-scanning direction

- Paper size in sub-scanning direction is detected by on/off status of the paper size sensors /Fr1 (PS33) and /Rr (PS34), /Fr2 (PS39) and /Rr2 (PS40), and /Fr3 (PS45) and /Rr3 (PS46).

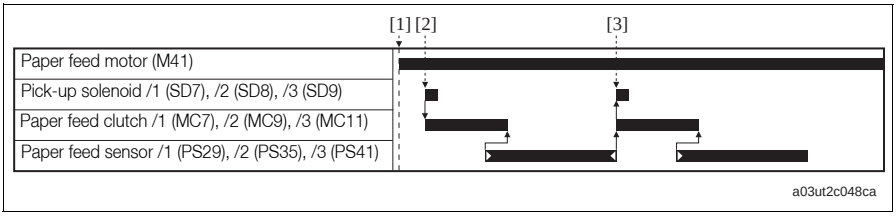
Paper size	Paper size sensors /Fr1 (PS33), /Fr2 (PS39), /Fr3 (PS45)	Paper size sensors /Rr1 (PS34), /Rr2 (PS40), /Rr3 (PS46)	Paper size VR/1 (VR1), /2 (VR2), /3 (VR3) *1
13 x 19	ON	ON	333.2
SRA3	ON	ON	317.0
SRA4	OFF	OFF	317.0
12 x 18	ON	ON	292.8
A3	ON	OFF	280.4
A4	OFF	OFF	280.4
11 x 17	ON	OFF	252.4
8½ x 11	OFF	OFF	252.4
8K	ON	OFF	237.4
16K	OFF	OFF	237.4
B4	ON	OFF	216.7
B5	OFF	OFF	216.7
8½ x14	ON	OFF	151.3
8½ x11S	OFF	OFF	151.3
A4S	OFF	OFF	141.9
8½ x13	ON	OFF	151.3
B5S	OFF	OFF	97.3
A5S	OFF	OFF	43.2
8½ x 5½S	OFF	OFF	30.0

*1 VR angles

15.3.3 Paper feed control

A. Pick-up control

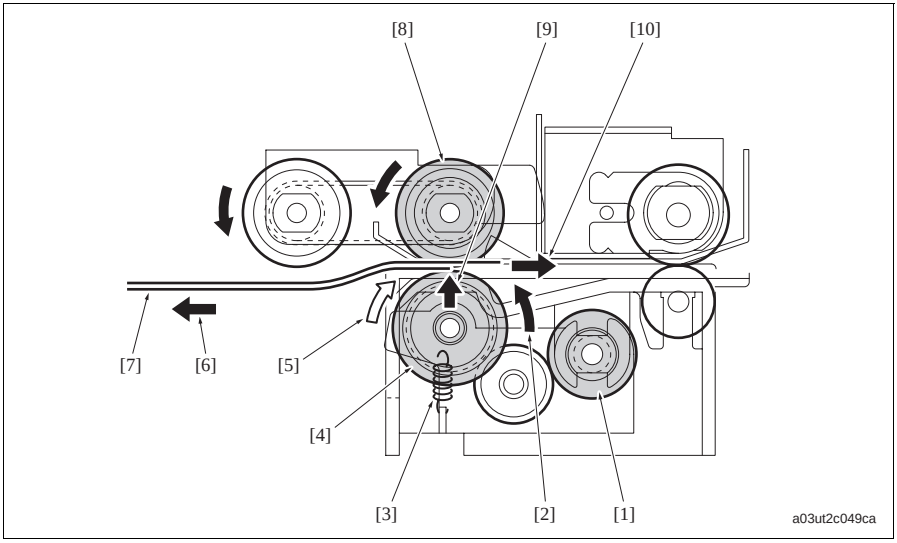
- The paper feed motor (M41) starts to rotate upon receiving a print start signal [1].
- After the specified time passed from when the start signal is received [1], the pick-up solenoids /1 (SD7), /2 (SD8) and /3 (SD9) and the paper feed clutches /1 (MC7), /2 (MC9) and /3 (MC11) are turned on.
- When the SD7, SD8 and SD9 turn on, the pick-up roller descends and presses the paper by its own weight.
- The pick-up roller rotates to feed the top sheet to the paper feed roller by means of the M41 drive force transmitted via the MC7, MC9, and MC11.
- The subsequent feeding by the pick-up roller is made when the paper feed sensors /1 (PS29), /2 (PS35), and /3 (PS41) detect the rear end of the previous paper [3].


[1] [2]
[3]
Paper feed motor (M41)
Pick-up solenoid /1 (SD7), /2 (SD8), /3 (SD9)
Paper feed clutch /1 (MC7), /2 (MC9), /3 (MC11)
Paper feed sensor /1 (PS29), /2 (PS35), /3 (PS41)
a03ut2c048ca

[1] Print start signal
[2] First pick-up
[3] Second pick-up

B. Separation mechanism

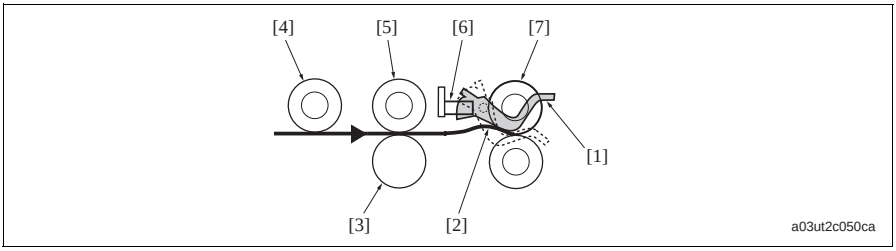
- The separation roller [4] is driven in the opposite direction [2] to the paper feed direction [10] via the torque limiter [1].
- The separation roller is pressed against the paper feed roller [8] by means of the spring [3] force [9] and the pressure applied from the torque limiter.
- The friction force between the separation roller and the paper feed roller is limited by the torque limiter in order to prevent multi-feed.
- When no paper exists between the separation roller and the paper feed roller or when the only one sheet of paper is present, the separation roller is driven by the paper feed roller in the direction of arrow [5] since the torque is over the limit.
- When multiple sheets of paper are fed, the separation roller reverses the direction of rotation [2] (opposite to the paper feed roller)
- the separation roller the direction of rotation [2] (opposite to the paper feed roller) feeds the lower paper [7] that contacts with the separation roller back to the tray [6]. The drop in frictional force between the two rollers due to the multiple sheets causes the counter rotating of the separation roller.



[1] Torque limiter
[2] Rotation toward the separation
[3] Spring
[4] Separation roller
[5] Driven rotation
[6] To the tray
[7] Second sheet of paper
[8] Paper feed roller
[9] Pressing force
[10] Paper feed direction

C. Loop formation mechanism

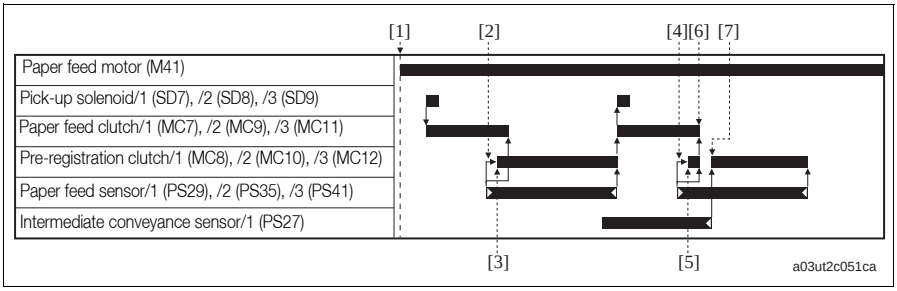
- The paper passed between the paper feed roller [5] and the separation roller [3] is conveyed to the pre-registration roller [7].
- The paper pushes the actuator [1] and the actuator turns on the paper feed sensors /1 (PS29), /2 (PS35) and /3 (PS41).
- In order to correct skew of the paper, the leading edge of the paper is pressed against the pre-registration roller that is not moving until the paper forms a small loop [2]. This is made by stopping the paper feed roller after the specified time passed from when the PS29, PS35, and PS41 turn on.



[1] Actuator
[2] Loop
[3] Separation roller
[4] Pick-up roller
[5] Paper feed roller
[6] PS29, PS35, PS41
[7] Pre-registration roller

D. Pre-registration control

- The pre-registration roller is driven by the paper feed motor (M41) via the pre-registration clutch /1 (MC8), /2 (MC10) and /3 (MC12).
- When paper feeding is started with the pick-up roller, the MC8, MC10 and MC12 do not transmit the drive force from the motor to the pre-registration roller so as not to rotate the roller.
- The fed paper is pressed against the pre-registration roller, and since the roller is stopping, the pressure causes the paper to form a small loop [2] in order to correct skew of the paper.
- The MC8, MC10, and MC12 start to transmit [3] the drive force to the pre-registration roller to rotate it after the specified time passed form when the paper feed sensors; /1 (PS29), /2 (PS35), /3 (PS41) turn on.
- The paper feed clutches; /1(MC7), /2 (MC9), and /3 (MC11) continue to transmit the drive force to the paper feed roller to assist the paper feed until the pre-registration roller grips the paper.
- The pre-registration operation for the second and subsequent papers [5] is performed turning off [6] the MC8, MC10, and MC12 after the specified time passed from when the PS29, PS35, and PS41 turn on so that the operation does not interrupt feeding of the previous paper.
- When the intermediate sensor /1 (PS27) turns on upon detection of the front edge of the previous paper, the MC8, MC10 and MC12 turns on again [7] and restart the pre-registration.

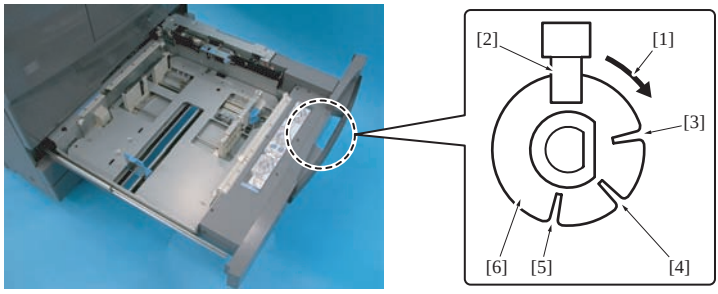


[1] Print start signal
[2] First sheet loop formation
[3] First sheet pre-registration
[4] Second sheet loop formation
[5] Second sheet pre-registration
[6] A pause of second sheet pre-registration
[7] Restart of second sheet pre-registration

15.3.4 Remaining paper detection control

- Remaining amount of papers in the tray is detected by the paper near empty sensor /1 (PS32), /2 (PS38), / 3 (PS44) [2].
- As the papers get lower, the actuator [6] on the front side of the tray is gradually rotated.
- The PS32, PS38 and PS44 turn on and off each time the slits [3], [4] and [5] of the actuator passes through.
- The main body control section counts the number of on/off's of the PS32, PS38 and PS44 to detect the amount of remaining paper in four levels.

Slit count	Remaining amount of paper	Remaining amount Indication on the touch panel
0	100 to 75%	4 lit
1	75 to 50%	3 lit
2	50 to 25%	2 lit
3	25 to 0%	1 lit

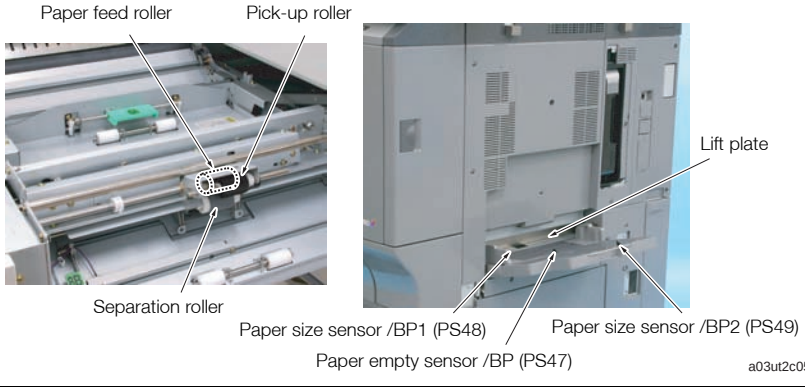


a03ut2c052ca

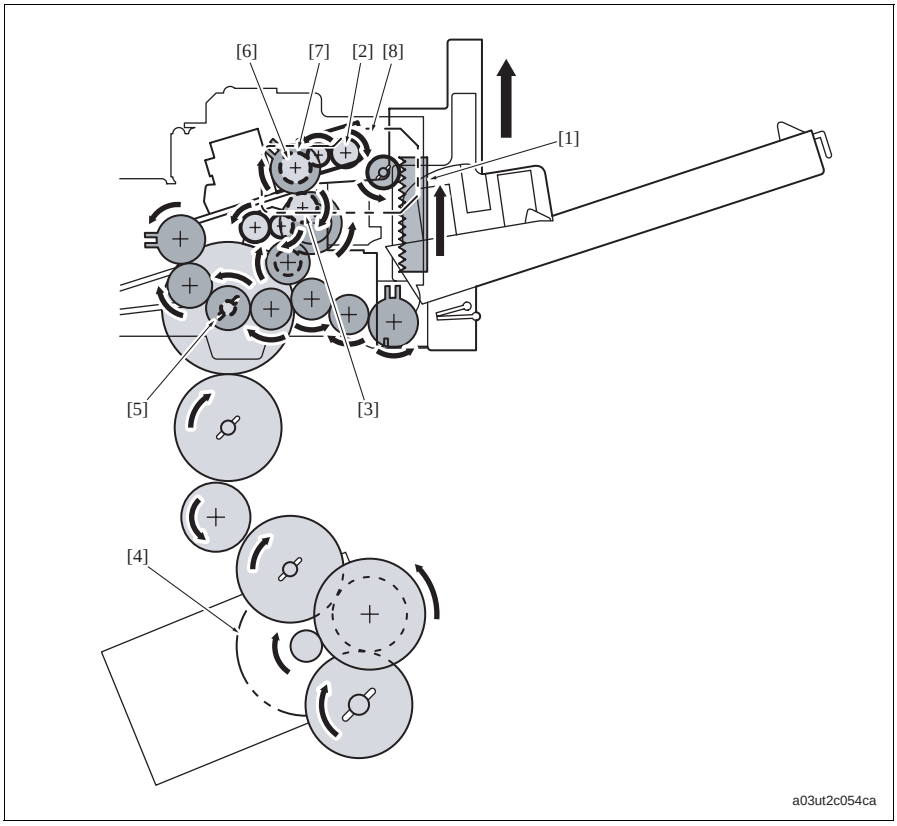
[1] Rotation direction when lift plate goes up
[2] PS32, PS38, PS44
[3] Slit
[4] Slit
[5] Slit
[6] Actuator

16. BYPASS FEED TRAY SECTION

16.1 Configuration



16.2 Drive



[1] Lift gear
[2] Pick-up roller
[3] Separation roller
[4] Paper feed motor (M41)
[5] Drive coupling
[6] Paper feed roller
[7] Paper feed clutch /BP (MC6)
[8] Paper lift motor /BP (M35)

16.3 Operation

16.3.1 Plate up/down control

A. Plate-up operation

- The paper lift motor /BP (M35) drives the lift gear to lift the lift plate.

B. Plate-down operation

- The paper lift motor /BP (M35) drives the lift gear to lower the lift plate.

C. Operation timing

(1) Plate-up operation

- When the tray is set, paper lift motor /BP (M35) rotates in forward and the lift plate goes up.
- The lift plate elevation makes the top sheet turns on the upper limit sensor /BP (PS25). This deactivates the M35 to stop the plate.
- When the PS25 are turned off by paper feeding, the M35 starts to rotate again to lift the lift plate. Then the PS25 is turned on again by the top sheet the and makes the M35 stop to stop lifting the lift plate.

(2) Plate-down operation

- The paper empty sensor /BP (PS47) turns off when the bypass feed tray runs out of paper. This makes the M35 rotate in reverse to lower the lift plate.
- The lift plate goes down when the paper is removed from the tray.
- When the paper supply door of LU is opened, the lift plate goes down.
- The M35 stops reverse rotation after the specified time passed to stop lowering the lift plate.

16.3.2 Paper size detection control

A. Detection in main scanning direction

- Paper size in main scanning direction is detected by the resistance value of the paper size VR/BP (VR4).
- The resistance value of the VR4 varies depending on the position of the guide plate.

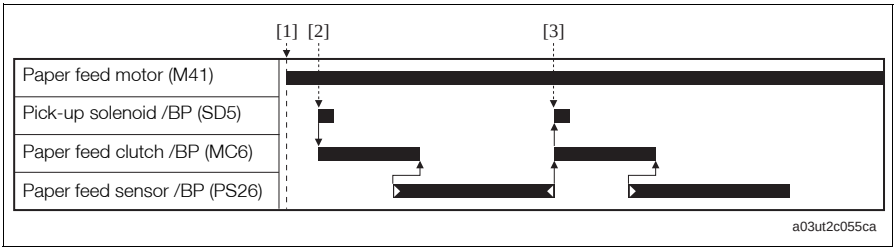
B. Detection in sub-scanning direction

- Paper size in sub-scanning direction is detected by ON/OFF statuses of the paper size sensors /BP1 (PS48) and /BP2 (PS49).

16.3.3 Paper feed control

A. Pick-up control

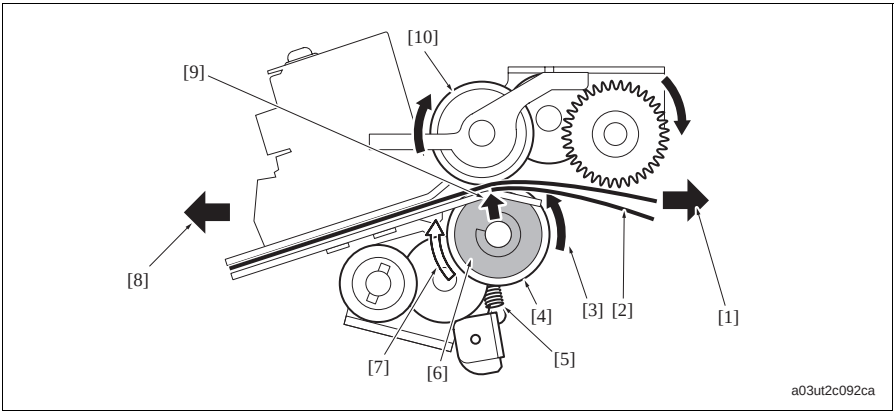
- The paper feed motor (M41) starts to rotate upon receiving a print start signal [1].
- After the specified time passed from when the start signal is received [1], the pick-up solenoid /BP (SD5) and the paper feed clutch /BP (MC6) are turned on [2].
- When the SD5 turns on, the pick-up roller descends and presses the paper by its own weight.
- The pick-up roller rotates to feed the top sheet to the paper feed roller by means of the M41 drive force transmitted via the MC6.
- The subsequent feeding by the pick-up roller is made when the paper feed sensor /BP (PS26) detects the rear end of the previous paper [3].



[1] Print start signal
[2] First pick-up
[3] Second pick-up

B. Separation mechanism

- The separation roller [4] is driven in the opposite [1] to the paper feed direction [8] via the torque limiter [6].
- The separation roller is pressed against the paper feed roller [10] by means of the spring [5] force [9] and the pressure applied from the torque limiter.
- The friction force between the separation roller and the paper feed roller is limited by the torque limiter in order to prevent multi-feed.
- When no paper exists between the separation roller and the paper feed roller or when the only one sheet of paper is present, the separation roller is driven by the paper feed roller in the direction of arrow [3] since the torque is over the limit.
- When multiple sheets of paper are fed, the separation roller reverses the direction of rotation [7] (opposite to the paper feed roller) and feeds the lower paper [2] that contacts with the separation roller back to the tray [1]. The drop in frictional force between the two rollers due to the multiple sheets causes the counter rotating of the separation roller.



[1]	To the tray	[6]	Torque limiter
[2]	Second sheet of paper	[7]	Rotation toward the separation
[3]	Driven rotation	[8]	Paper feed direction
[4]	Separation roller	[9]	Spring force
[5]	Spring	[10]	Paper feed roller

16.3.4 Paper empty detection control

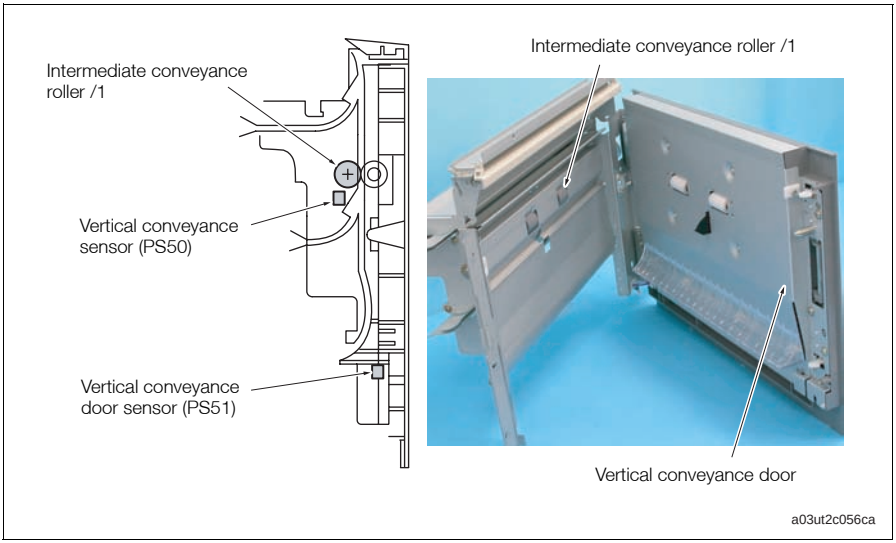
- No paper status of the tray is detected by the paper empty sensor /BP (PS47).

16.3.5 Remaining paper detection control

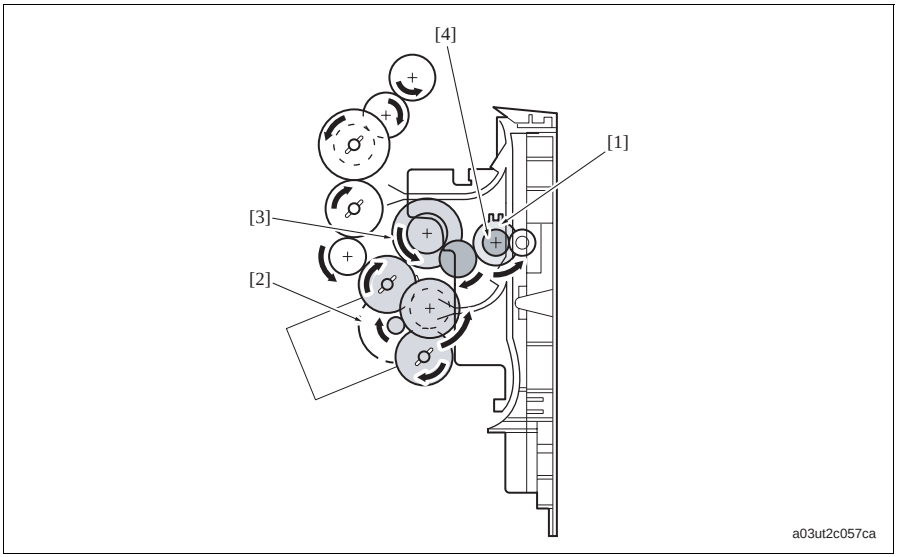
- When the paper empty sensor /BP (PS47) turns off, a message saying that the bypass feed tray is empty appears on the touch panel.

17. VERTICAL CONVEYANCE SECTION

17.1 Configuration



17.2 Drive



[1] Intermediate conveyance clutch /1 (MC13)
[2] Paper feed motor (M41)
[3] Drive coupling
[4] Intermediate conveyance roller /1

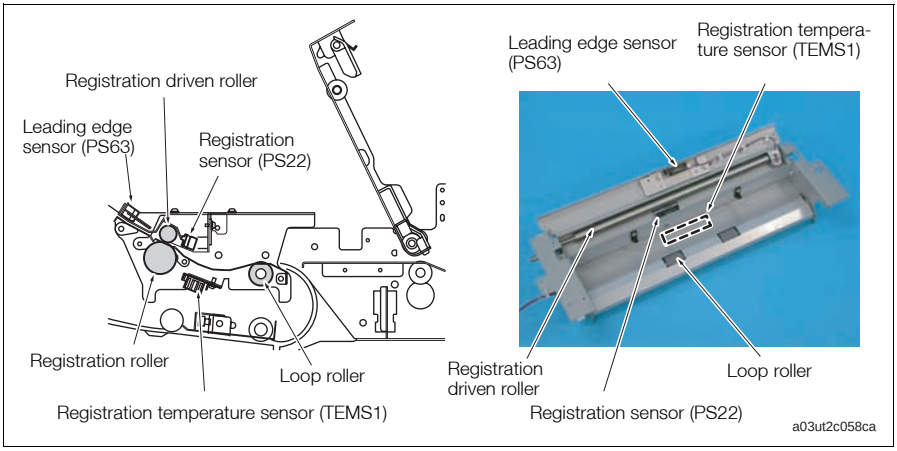
17.3 Operation

17.3.1 Vertical conveyance control

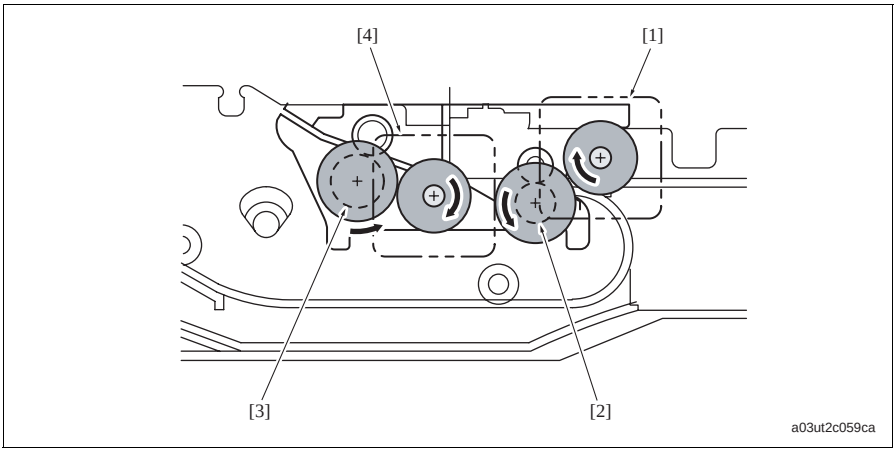
- Paper that is fed from trays /1, /2 and /3 is conveyed to the intermediate conveyance section of ADU.
- Paper that is fed from the tray /1 is conveyed to the intermediate conveyance roller /2 of the intermediate conveyance section (ADU) by the pre-registration roller.
- The intermediate conveyance roller /1 assists to convey the paper that is fed from the trays /2 and /3 because the conveyance distance to the intermediate conveyance roller /2 is rather long.
- The paper feed motor (M41) drives the intermediate conveyance roller /1 via the intermediate conveyance clutch /1 (MC13).
- The MC13 turns ON at the same time as the paper feed clutches /1 (MC7), /2 (MC9) and /3 (MC11) turn on.
- The MC13 turns OFF after the specified time passed from when the intermediate conveyance sensor /1 (PS27) turns on.

18. REGISTRATION SECTION

18.1 Configuration



18.2 Drive

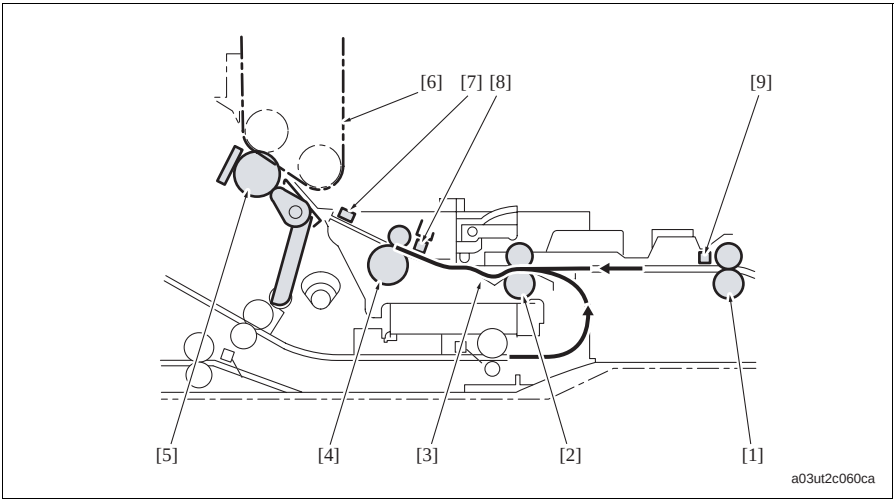


[1] Loop motor (M31)
[2] Loop roller
[3] Registration roller
[4] Registration motor (M30)

18.3 Operation

18.3.1 Loop control

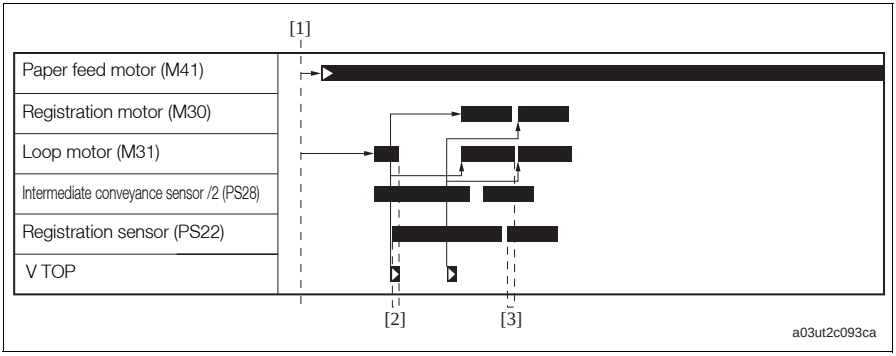
- All papers are passed through the loop roller and conveyed to the registration roller.
- Loop motor (M31) that drives the loop roller stops after specified time passed from when the registration sensor (PS22) turns ON upon detecting the leading edge of paper.
- Because the registration motor (M30) is stopping, the leading edge of paper is pressed against the registration roller that is not moving. The paper forms a small loop before the M31 stops.
- Making paper form a loop enables to correct skew of the paper.



[1] Intermediate conveyance roller /2
[2] Loop roller
[3] Registration loop
[4] Registration roller
[5] Second transfer roller /Lw
[6] Transfer belt unit
[7] Leading edge sensor (PS63)
[8] Registration sensor (PS22)
[9] Intermediate conveyance sensor /2 (PS28)

18.3.2 Registration operation

- After the specified time passed from when the print start signal is received [1], the loop motor (M31) starts to turn to rotate the loop roller.
- The paper conveyed from the intermediate conveyance section or the ADU is conveyed to the registration roller by the loop roller.
- When the registration sensor (PS22) detects the paper front-end, M31 turns OFF after the specified time passed.
- At this point, because the registration motor (M30) is stopping, the paper is pressed against the registration roller and forms a small loop [2] before the M31 stops.
- Making paper from a small loop enables to correct skew of the paper.
- The V_TOP signal is generated when the transfer belt becomes ready for the first transfer.
- After the specified time passed from when the V_TOP signal is received, the M30 and M31 stop and carry out registration.



[1] Print start signal is received

[2] First sheet registration loop

[3] Second sheet registration loop

18.3.3 Paper leading edge timing correction control

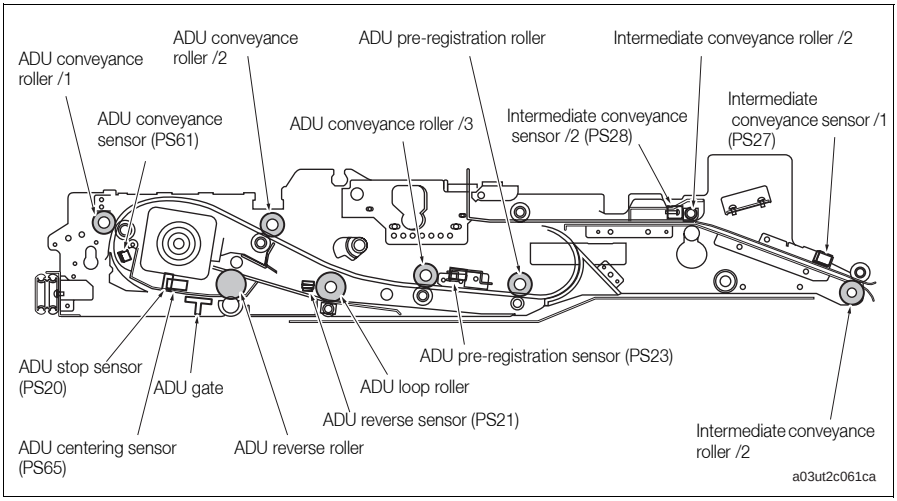
- The time period from when the registration motor (M30) starts to rotate until the leading edge sensor (PS63) detects the leading edge of paper is counted.
- Based on the counted time, the time when the paper gets to the second transfer section is estimated.
- If the estimated arrival time is earlier/later than the proper arrival time, the deceleration timing of the registration roller and the loop roller line speed is adjusted to meet the arrival timing.
- The timing correction control is carried out for every sheet of paper.

18.3.4 Registration speed correction control

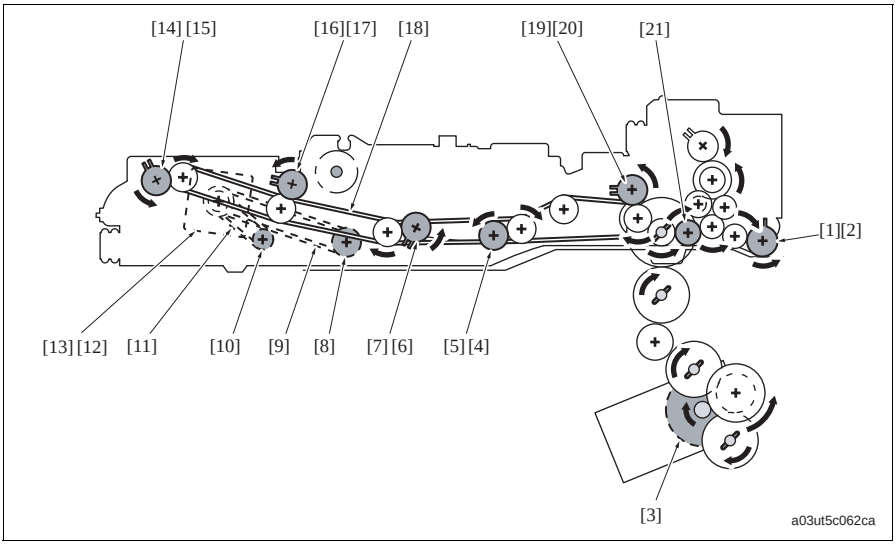
- When restarting registration, the registration roller and loop roller conveyance speed are adjusted according to the ambient temperature detected by the registration temperature sensor (TEMS1).
- The TEMS1 measures the temperature at regular intervals.
- The speed of the registration speed correction control is the same as normal line speed when TEMS1 detection temperature is 25 °C.

19. ADU SECTION

19.1 Configuration



19.2 Drive



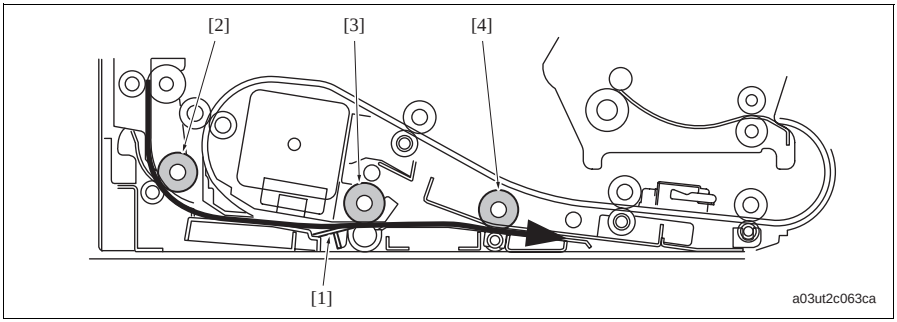
[1] Intermediate conveyance roller /2
[2] Intermediate conveyance clutch /2 (MC4)
[3] Paper feed motor (M41)
[4] ADU pre-registration roller
[5] ADU pre-registration clutch (MC18)
[6] ADU conveyance roller /3
[7] ADU conveyance clutch /3 (MC3)
[8] ADU loop roller
[9] Belt
[10] ADU reverse roller
[11] Belt
[12] ADU loop motor (M57)
[13] ADU reverse motor (M32)
[14] ADU conveyance roller /1
[15] ADU conveyance clutch /1 (MC1)
[16] ADU conveyance roller /2
[17] ADU conveyance clutch /2 (MC2)
[18] Belt
[19] Intermediate conveyance roller /3
[20] Intermediate conveyance clutch /3 (MC5)
[21] Drive coupling

19.3 Operation

19.3.1 Paper reverse control

A. Paper conveyance

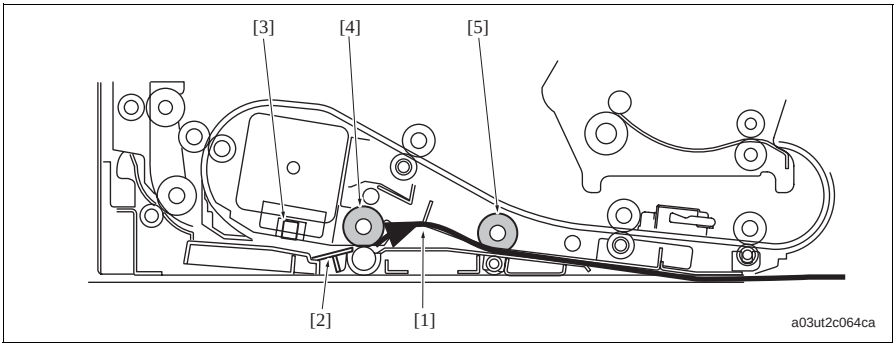
- During paper conveyance, the ADU gate [1] is open.
- Paper conveyed from the reverse roller /Lw [2] is conveyed to the ACU reverse roller [3] through the ADU gate.
- Paper conveyed to the ADU reverse roller is then conveyed to the ADU loop roller [4].



[1] ADU gate
[2] Reverse roller /Lw
[3] ADU reverse roller
[4] ADU loop roller

B. Loop formation

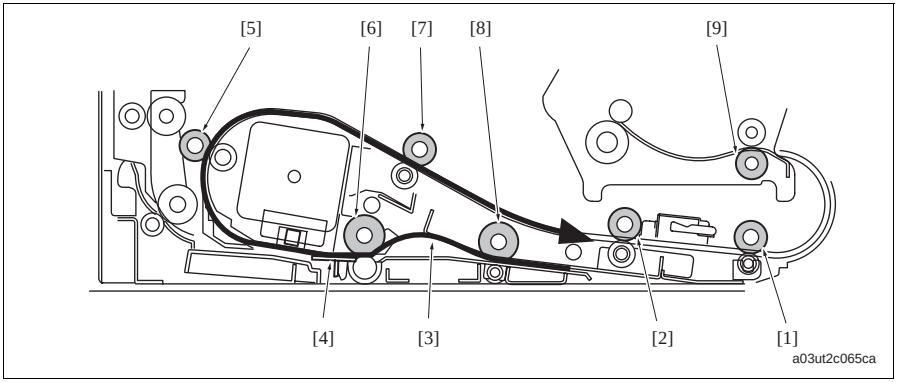
- When the ADU stop sensor (PS20) [3] detects the rear end of paper and turns OFF, ADU loop roller [5] stops after the specified time passed.
- While the paper is stopped with its leading edge nipped by the ADU loop roller, the ADU reverse roller [4] continues to rotate.
- The ADU reverse roller stops after the rear end of the paper passed through. (after the specified time passed from when the ADU loop roller stops.)
- The above two rollers' operation make the paper form a loop [1] between the two rollers.
- When the paper is forming the loop, its rear edge is pressed against the ADU reverse roller. This enables to correct skew of the paper before starting the reverse paper conveyance.



[1] Loop
[2] ADU gate
[3] PS20
[4] ADU reverse roller
[5] ADU loop roller

C. Paper reverse

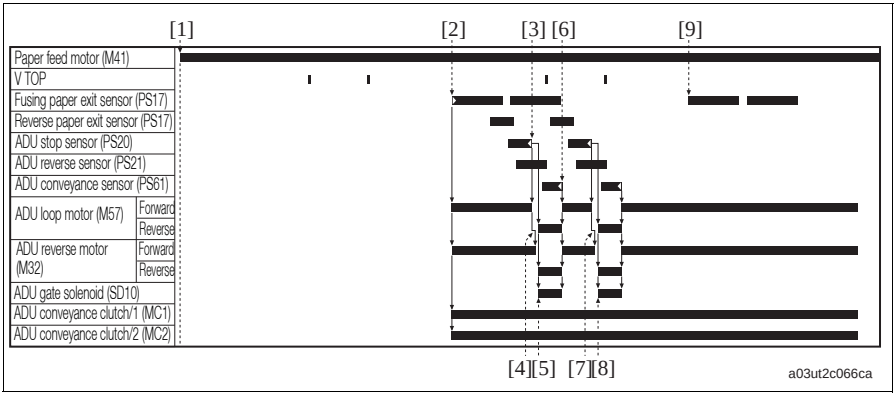
- When the ADU reverse roller [6] stops, the ADU gate [4] closes.
- After the specified time passed from when the ADU reverse roller stops, the ADU loop roller [8] and ADU reverse roller rotate reversely at the same time.
- Paper is conveyed in the reverse direction keeping the loop [3], and because the ADU gate is closed, it is conveyed to the ADU conveyance roller /1 [5].
- By means of the above operations, the paper is turned upside down.
- Then the paper is conveyed to the ADU conveyance roller /2 [7], /3 [3], ADU pre-registration roller [1] and loop roller [9] for back side printing.



[1] ADU pre-registration roller
[2] ADU conveyance roller /3
[3] Loop
[4] ADU gate
[5] ADU conveyance roller /1
[6] ADU reverse roller
[7] ADU conveyance roller /2
[8] ADU loop roller
[9] Loop roller

19.3.2 ADU conveyance control

- When the front side of the first sheet is fixed [2], after receiving a print start signal [1], the ADU loop motor (M57) and the ADU reverse motor (M32) start to rotate in the normal direction.
- When the ADU stop sensor (PS20) detects the rear end [3] of the first sheet while the paper is conveyed to the reverse paper exit section, the M57 stops to stop the ADU loop roller.
- The M32 stops after the M57stops. This makes the paper form a loop [4] between the ADU loop roller and the ADU reverse roller.
- After the specified time passed from when the PS20 turns off [3], the ADU gate solenoid (SD10) turns on [5] and closes the ADU gate. At the same time, the M57 and M32 start to rotate in reverse direction to convey the paper reversely.
- When the ADU conveyance sensor (PS61) provided on the ADU conveyance section detects the rear end of the paper [6], the rotation direction of the M57 and M32 is switched to normal. The SD10 turns off and opens the ADU gate again for the next paper.



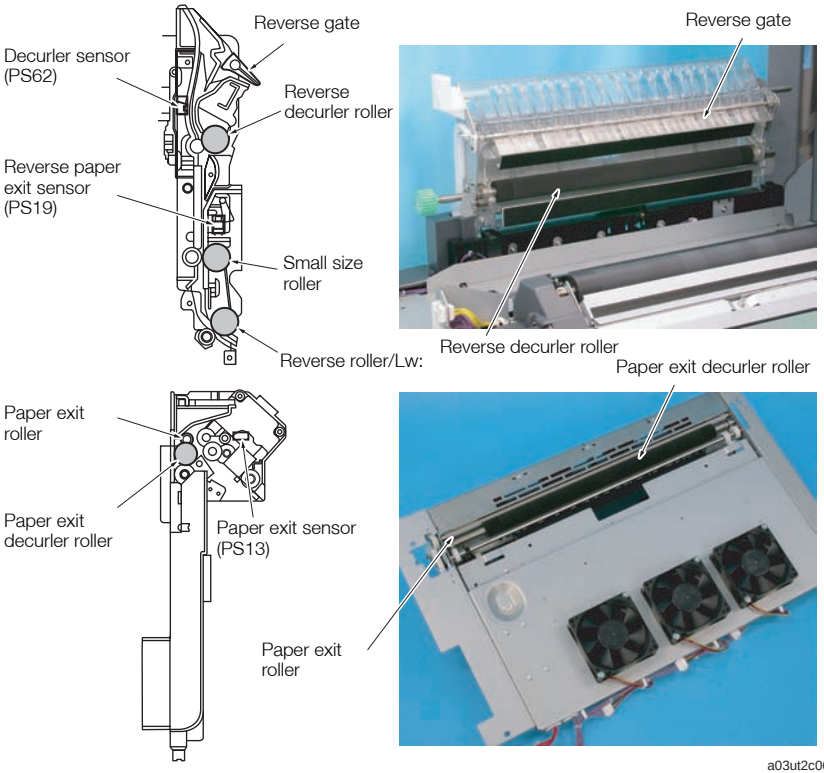
[1] Print start signal is received
[2] First sheet front side fusing complete
[3] First sheet paper back end detection
[4] First sheet loop formation
[5] ADU gate close
[6] Second sheet paper rear end detection
[7] Second sheet loop formation
[8] ADU gate close
[9] First sheet back side fusing complete

19.3.3 Back side centering correction control

- The ADU centering sensor (PS65) detects the paper edges of the paper that has been reverse conveyed from the ADU reverse roller for back side printing.
- Depending on the detected value, the distance from the center to the edge of paper is calculated, and the laser writing position is adjusted so that the image is precisely centered on the printed page.

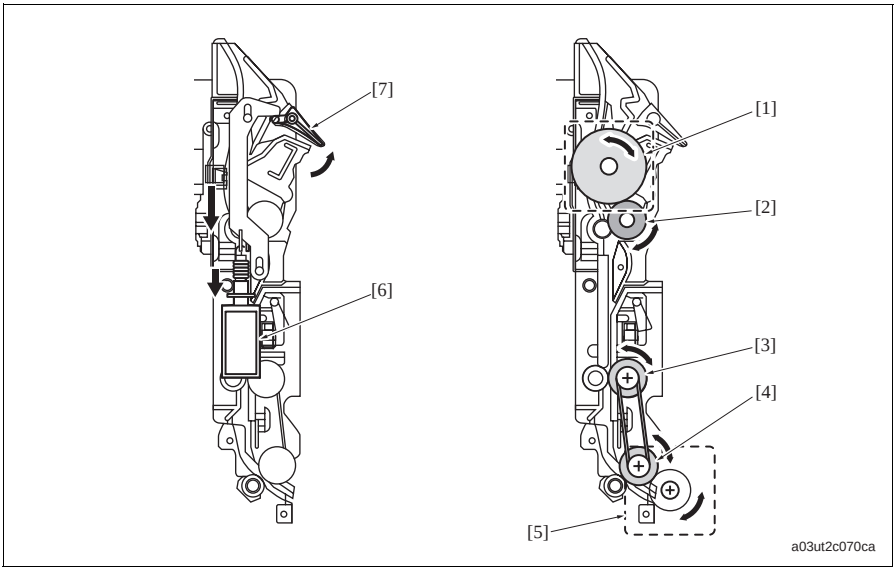
20. REVERSE/PAPER EXIT SECTION

20.1 Configuration



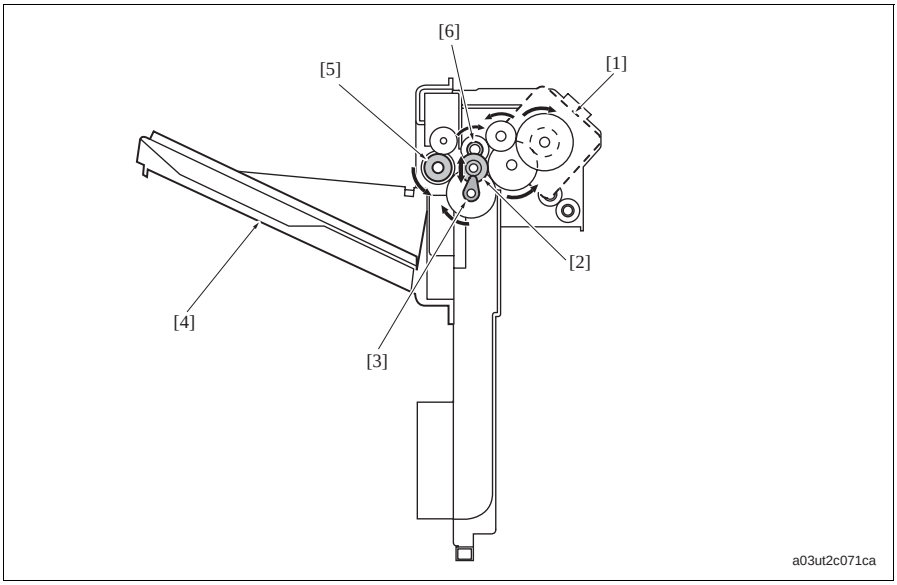
20.2 Drive

20.2.1 Reverse/paper exit drive



[1] Decurler motor (M55)
[2] Reverse decurler roller
[3] Small size roller
[4] Reverse roller /Lw
[5] Reverse paper exit motor (M33)
[6] Paper exit solenoid (SD4)
[7] Reverse gate

20.2.2 Paper exit drive/OT-502 drive



[1] Paper exit motor (M54)
[2] Paper exit decurler roller
[3] Cam
[4] OT-502
[5] OT paper exit roller
[6] Paper exit roller

20.3 Operation

20.3.1 Conveyance control

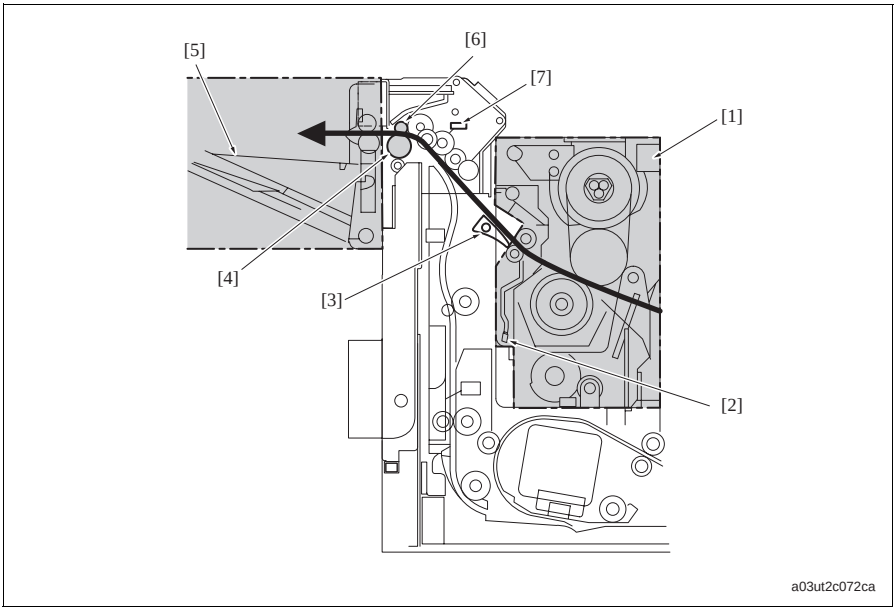
A. Reverse/paper exit switch control

- The paper exit path for paper conveyed from the fusing section is switched by the paper exit gate.
- The paper exit gate is driven by the paper exit solenoid (SD4).
- Switching the paper exit path with the gate is made according to the print mode and the paper exit type.

B. Conveyance path

(1) Straight paper exit

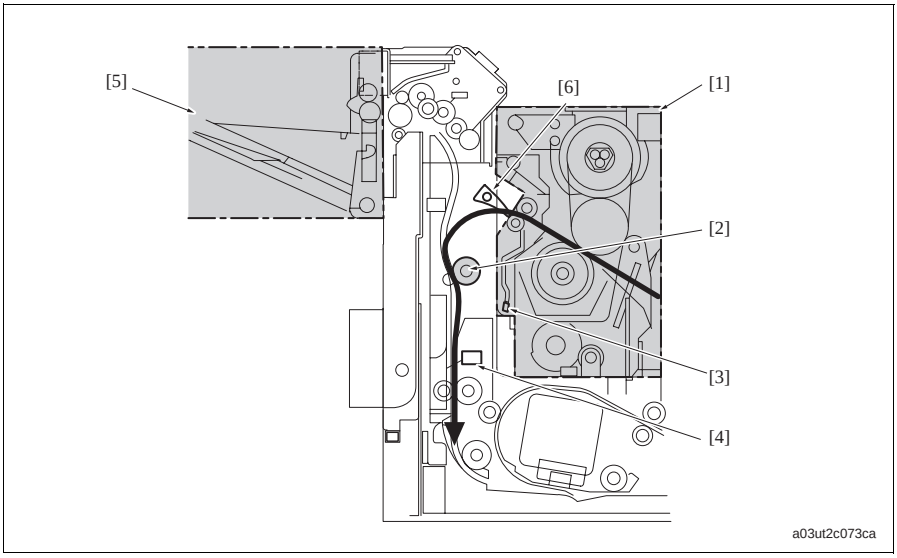
- Paper is exited face-up after printed on the one side or printed on the both sides.



[1] Fusing section
[2] Fusing paper exit sensor (PS17)
[3] Reverse gate
[4] Paper exit decurler roller
[5] OT-502 (Option)
[6] Paper exit roller
[7] Paper exit sensor (PS13)

(2) ADU conveyance path

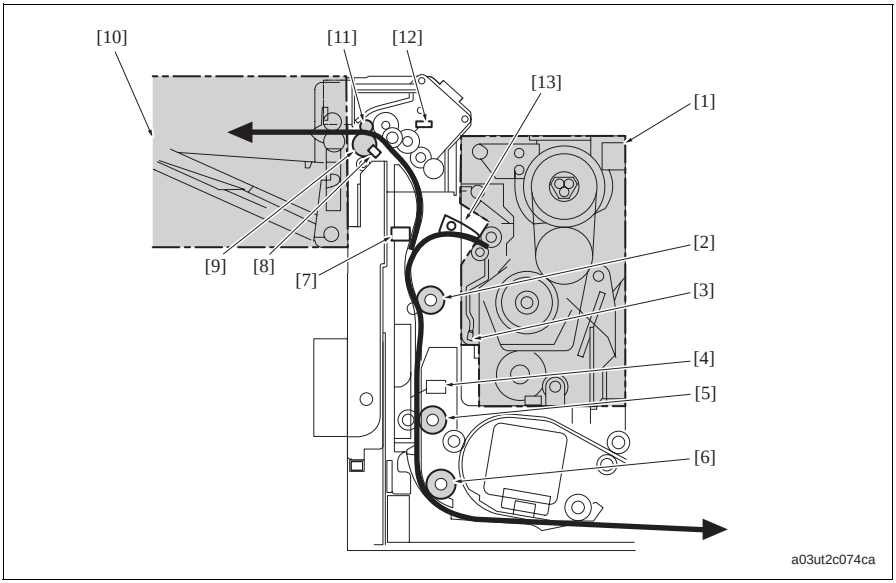
- This paper path is used to exit paper face down after printing the one side for one-side printing or double-side printing.



[1] Fusing section
[2] Reverse decurler roller
[3] Fusing paper exit sensor (PS17)
[4] Reverse paper exit sensor (PS19)
[5] OT-502 (Option)
[6] Reverse gate

C. Reverse/paper exit

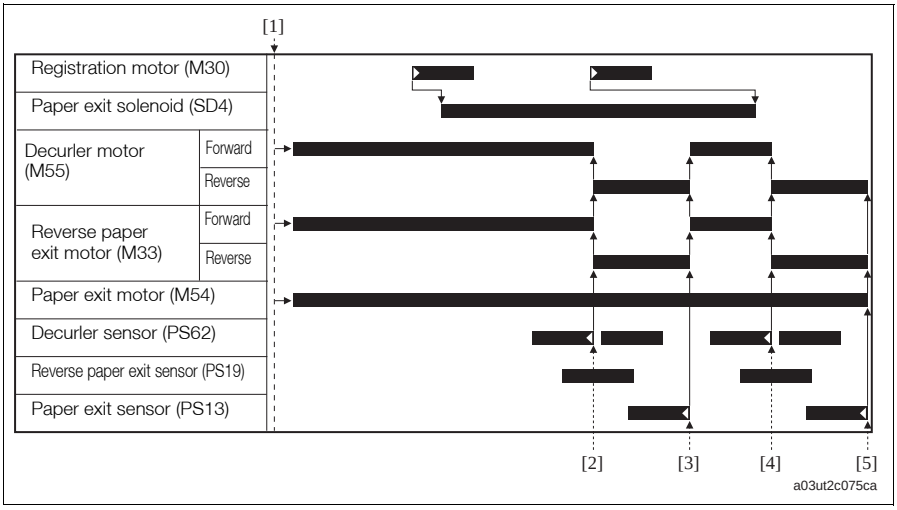
- This paper path is used to exit paper face down after printing on the backside in one-side printing or double-side printing.



[1] Fusing section
[2] Reverse decurler roller
[3] Fusing paper exit sensor (PS17)
[4] Reverse paper exit sensor (PS19)
[5] Small size roller
[6] Reverse roller /Lw
[7] Decurler sensor (PS62)
[8] Paper exit pressure sensor (PS10)
[9] Paper exit decurler roller
[10] OT-502 (Option)
[11] Paper exit roller
[12] Paper exit sensor (PS13)
[13] Reverse gate

20.3.2 Reverse/paper exit timing control

- In face down paper exit, paper conveyed from the fusing section to the reverse decurler roller passing under the reverse gate.
- The reverse decurler roller conveys the paper to the small size roller by the normal rotation of the decurler motor (M55).
- The small size roller and the reverse roller /Lw convey the paper to the ADU reverse section by the reverse paper exit motor (M33).
- When the decurler sensor (PS62) detects the rear end of paper and turns off [2], the M55 and M33 switch to reverse rotation.
- The rollers rotate in reverse and convey the paper in reverse direction, but due to the guide on the conveyance path, the paper is conveyed to the paper exit roller, not to the reverse gate side.
- By means of the above operations, paper is exited with its upside down.
- When the paper exit sensor (PS13) detects the rear end of the paper and turns off [3], the M55 and M33 starts the normal rotation again and the next paper is reversed/exited.



[1] Print start signal is received

[2] First sheet reverse conveyance

[3] First sheet exit

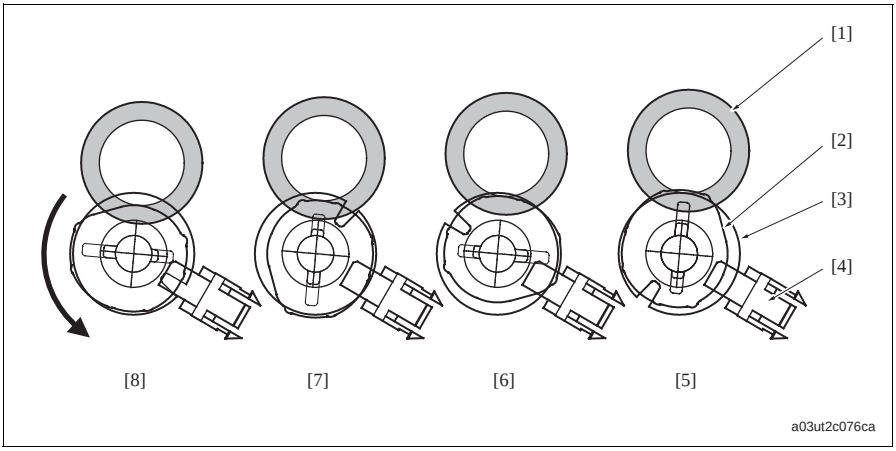
[4] Second sheet reverse conveyance

[5] Second sheet exit

20.3.3 Paper exit decurler roller pressure control

A. Paper exit decurler roller pressure mechanism

- The paper exit decurler roller [1] that faces to the paper exit roller is pressed by the rotation of the cam [2].
- The cam is driven by the paper exit motor (M54).
- Forward rotation of the M54 causes paper exit operation, and its reverse rotation moves the cam to apply pressure to the paper exit decurler roller.
- The cam and the encoder [3] are located on the same shaft. Paper exit pressure sensor (PS10) [4] detects the slits on the encoder in order to determine the home position of the decurler roller.
- The pressure applied to the paper exit decurler roller is changed by the cam position in four levels; release [8], low pressure [7], middle pressure [6], and high pressure [5]. The pressure level is controlled according to the time period of the M54 rotation from when the PS10 turns off.



[1] Paper exit decurler roller
[2] Cam
[3] Encoder
[4] PS10
[5] High pressure
[6] Middle pressure
[7] Low pressure
[8] Release

B. Print mode and paper exit decurler roller pressure level

- The pressure level applied to the paper exit decurler roller changes according to print mode.

Print mode	Pressure amount
Standby, jam processing	Release
Straight paper exit mode	Low pressure
Double-sided mode	Middle pressure
Reverse paper exit mode	High pressure

20.3.4 Reverse decurler roller rotation control

A. Purpose

- To prevent the reverse decurler roller from deformation when the roller has not been used for certain period of time.
- To minimize unevenness in temperature on the decurler roller surface, which can cause unevenness in color of printed images, after a continuous printing is carried out.

B. Operation timing

- The decurler motor (M55) operates under the following conditions to rotate the reverse decurler motor.

Device status	Remaining paper	Rotation speed	Rotational direction
Standby	Executing image stabilization operation	1/1 speed (high)	Reverse
After finishing printing	5 minutes	1/1 speed (high)	Reverse

NOTE

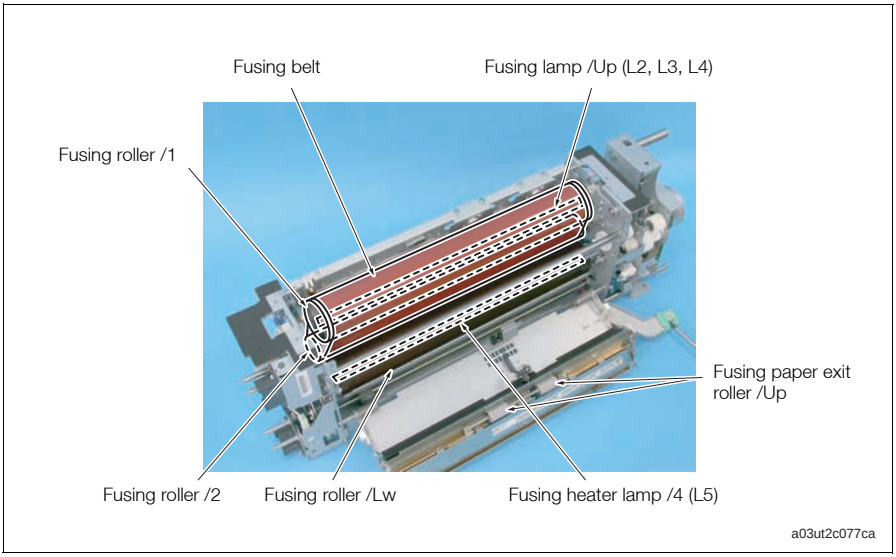
- **When a new print job is received, the after-printing operation is canceled to accept the job.**
- **The after-printing operation can be enabled/disabled with software DipSW.**
- **This control is not carried out by default.**

20.3.5 Paper exit full detection control

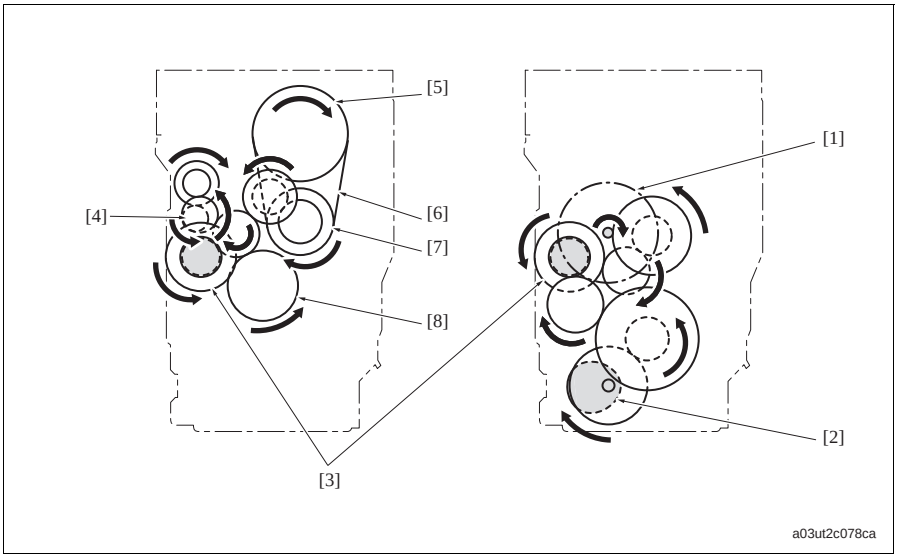
- When the OT-502 (option) is installed in the paper exit section, paper exit full detection control is performed.
- The OT-502 paper exit full sensor (PS12) is kept on while the OT-502 tray is used. If the prescribed number of sheets are exit, or if the "on" status of the sensor is kept for a certain time period, it is detected as a full status of the OT-502 tray and a message notifying the status appears on the touch panel.

21. FUSING SECTION

21.1 Configuration



21.2 Drive



[1] Fusing motor (M29)
[2] Cam (fusing roller /Lw for applying pressure)
[3] Same gear
[4] Fusing exit roller /Lw
[5] Fusing roller /1
[6] Fusing belt
[7] Fusing roller /2
[8] Fusing roller /Lw

21.3 Operation

21.3.1 Fusing roller drive control

A. Fusing process speed table

- There are three types of fusing process speed 1/1 speed (300mm/s), 2/3 speed (207mm/s), 1/2 speed (150mm/s).
- The fusing process speed is selected according to the paper weight (thickness) and whether the glossy mode or not as shown in the table below.

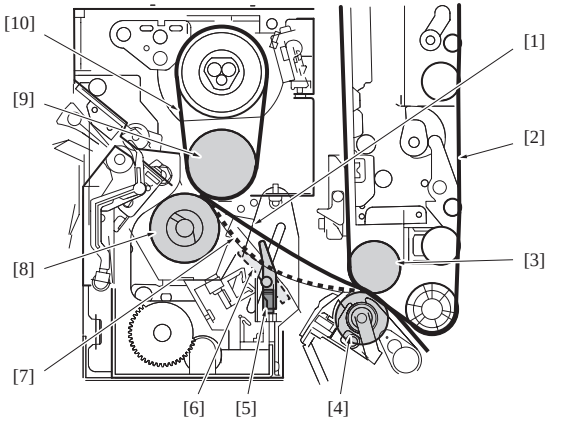
Paper weight		Paper type *1									
		A		B		C		D		E	
		Normal	Glossy	Normal	Glossy	Normal	Glossy	Normal	Glossy	Normal	Glossy
64 to 74g/m^2	High speed	1/1	1/1	—	—	—	—	—	—	—	—
	Middle speed	2/3	1/1	—	—	—	—	—	—	—	—
75 to 80g/m^2	High speed	1/1	1/1	—	—	—	—	—	—	—	—
	Middle speed	2/3	1/1	—	—	—	—	—	—	—	—
81 to 105g/m^2	High speed	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	Middle speed	2/3	1/1	2/3	1/1	2/3	1/1	2/3	1/1	2/3	1/1
106 to 135g/m^2	High speed	1/1	2/3	1/1	2/3	1/1	2/3	1/1	2/3	1/1	2/3
	Middle speed	2/3	2/3	2/3	2/3	2/3	2/3	2/3	2/3	2/3	2/3
	Low speed	1/2	2/3	1/2	2/3	1/2	2/3	1/2	2/3	1/2	2/3
136 to 162g/m^2	Middle speed	2/3	1/2	2/3	1/2	2/3	2/3	2/3	1/2	2/3	2/3
	Low speed	1/2	1/2	1/2	1/2	1/2	2/3	1/2	1/2	1/2	2/3
163 to 209g/m^2	Middle speed	2/3	1/2	2/3	1/2	2/3	2/3	2/3	1/2	2/3	2/3
	Low speed	1/2	1/2	1/2	1/2	1/2	2/3	1/2	1/2	1/2	2/3
210 to 256g/m^2		1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
257 to 300g/m^2		1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

*1 Paper select mode and paper type

Paper select mode	Paper type
Plain paper	A
Color specific	A
Colored paper	A
High quality paper	A
Coated paper GL	B
Coated paper ML	C
Coated paper GO	D
Coated paper MO	E

B. Fusing process speed correction control

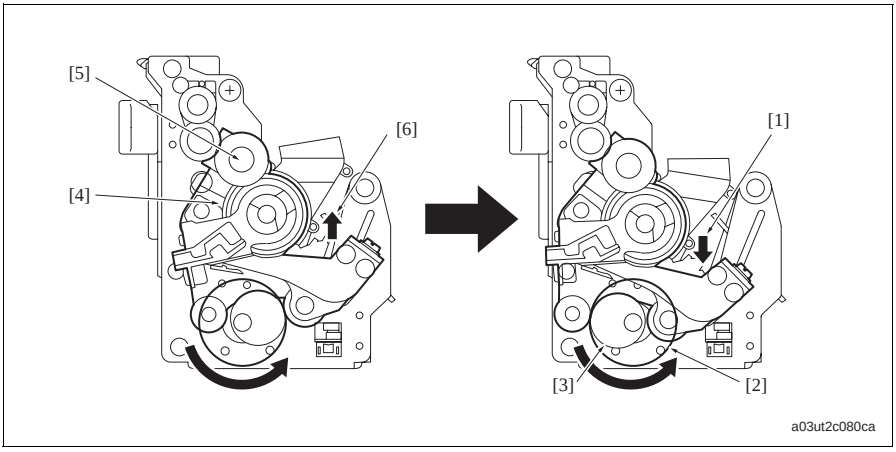
- This control is carried out to avoid improper slack in paper when the paper comes to the fusing section from the second transfer section.
- If the fusing process speed differs from the process speed of the second transfer section (difference in speed between the fusing roller /Lw [8] and the second transfer roller /Lw [4]) when the leading edge of the paper is nipped [1] by the fusing roller /Lw, the paper loop amount becomes increase.
- The fusing loop sensor (PS64) [5], located between the second transfer roller /Lw and the fusing roller /Lw, detects the paper loop.
- When the paper loop is detected by the PS64, the fusing process speed is corrected so that it becomes faster than the preset speed.
- The fusing process speed correction control is applied to all the 1/1 speed, 2/3 speed and 1/2 speed.



[1] Proper paper loop
[2] Transfer belt
[3] Second transfer roller /Up
[4] Second transfer roller /Lw
[5] PS64
[6] Actuator
[7] Improper paper loop
[8] Fusing roller /Lw
[9] Fusing roller /2
[10] Fusing belt

21.3.2 Pressure/release control

- The fusing roller /Lw is pressed against the fusing belt during performing a print job.
- When the fusing paper exit sensor (PS17) detects paper (the last page of the job) after completion of fusing, the fusing roller /Lw moves to stop pressing the fusing belt.
- The fusing roller drive assy which includes the fusing roller /Lw moves up/down to press/release the fusing belt with the roller.
- The up/down movements of the fusing roller drive assy are made by the cam which is driven by the fusing motor (M29).
- The home position of the cam is determined by the fusing release home sensor (PS16). The sensor detects the cam position with the actuator attached to the cam shaft.
- A one-way clutch is provided on the M29 drive transmission path toward the drive gear so that the M29 drive force is transmitted only to the cam when the M29 is rotating in reverse direction.

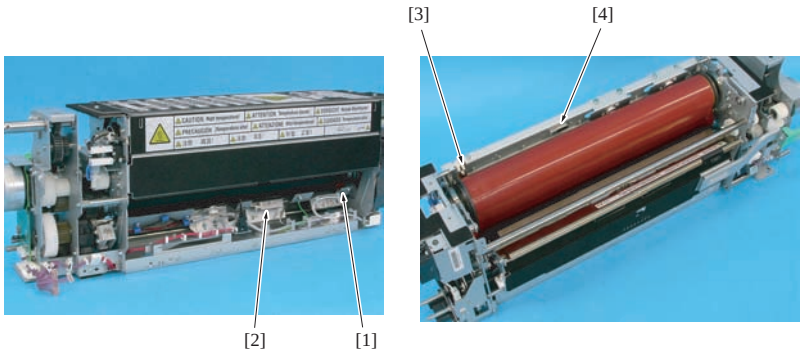


[1] Release
[2] Pressure/release driver gear
[3] Cam
[4] Fusing roller /Lw
[5] Fusing roller /Lw driver gear
[6] Pressure

21.3.3 Fusing temperature control

A. Fusing temperature detection

- The fusing roller /1 is heated by the fusing heater lamp /1 (L2), /2 (L3), /3 (L4).
- The fusing belt is heated by the heated fusing roller /1.
- The fusing roller /Lw is heated by the fusing heater lamp /4 (L5).
- The surface temperature of the fusing belt is detected by the temperature sensor /1 (TEMS/1), /3 (TEMS/3).
- The surface temperature of the fusing roller /Lw is detected by the temperature sensor /2 (TEMS/2), /4 (TEMS/4).
- Each temperature sensor monitors the surface temperature of the fusing belt and fusing roller /Lw at specified time intervals, and the AC drive board (ACDB) turns the lamps; L2, L3, L4, L5 ON/OFF according to the detected temperatures.



a03ut2c081ca

[1] Temperature sensor /4 (TEMS/4)
[2] Temperature sensor /2 (TEMS/2)
[3] Temperature sensor /3 (TEMS/3)
[4] Temperature sensor /1 (TEMS/1)

B. Fusing heater control

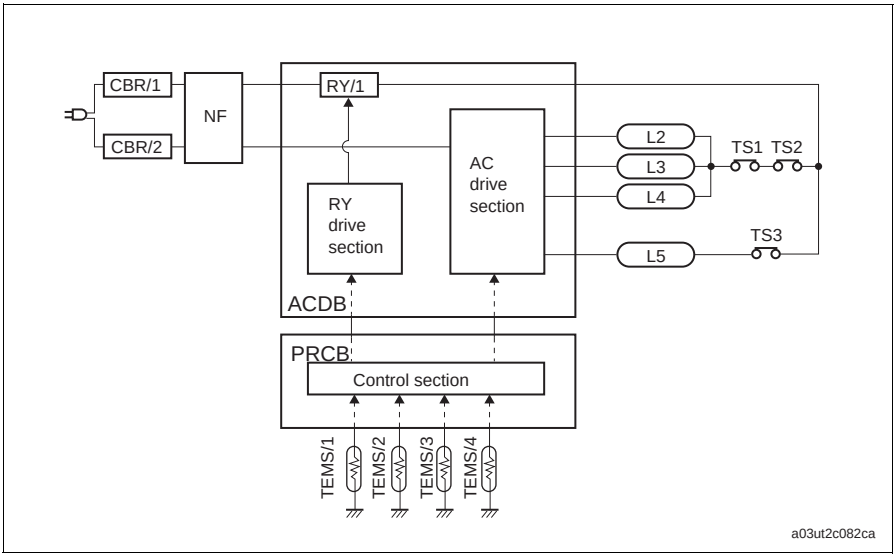
- The ON/OFF statuses of the four fusing heater lamps /1 (L2), /2 (L3), /3 (L4), /4 (L5) are predetermined for each mode as shown below.

Mode	L2	L3	L4	L5
Warm-up	ON	ON	OFF	ON
standby	OFF	OFF	ON	ON
Charging mode	ON	ON	OFF	ON
Printing	ON	*1	OFF	ON
Low power mode	OFF	OFF	ON	ON
Returned from low power mode	ON	ON	OFF	ON
Shut off mode	OFF	OFF	OFF	OFF

*1 During printing, the L3 is turned on/off according to the temperature detected by the temperature sensor / 3 (TEMS/3) and the paper size in the main scan direction.

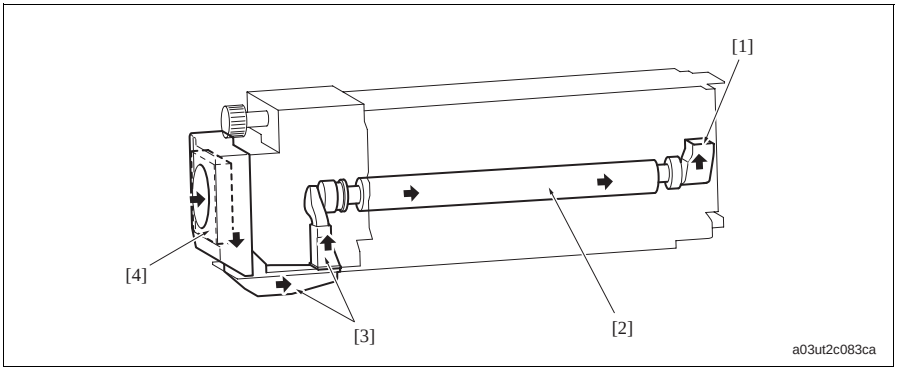
21.3.4 Protection against abnormality

- When the temperature sensor /1 (TEMS/1), /2 (TEMS/2), /3(TEMS/3), /4 (TEMS/4) is over the prescribed temperature for a specified time period, it is judged as a high temperature error and the main relay (RY1) is turned off, then the product is stopped after the first transfer, second transfer and fusing pressure are stopped/released.
- When the temperature sensor /1 (TEMS/1), /2 (TEMS/2), /3 (TEMS3), /4 (TEMS/4) detect a temperature of under -50 °C continuously for a specified time period, it is judged as a low temperature error and the main relay (RY1) is turned off, then the product is stopped after the first transfer, second transfer and fixing pressure are stopped/released.
- The thermostat /1 (TS1), /2 (TS2) shut down the power line to the fusing heater lamp /1 (L2), /2 (L3), /3 (L4) at 190 ± 7 °C.
- The thermostat /3 (TS3) shuts down the power line to the fusing heater lamp /4 (L5) at 160 ± 7 °C.
- When the fusing temperature abnormality occurs, the relay-off status is maintained by latch (SC latch) and an error message appears on the touch panel.
- After troubleshooting the cause of the error, the SC latch must be released by the software DipSW3-1.



21.3.5 Fusing roller/Lw cooling control

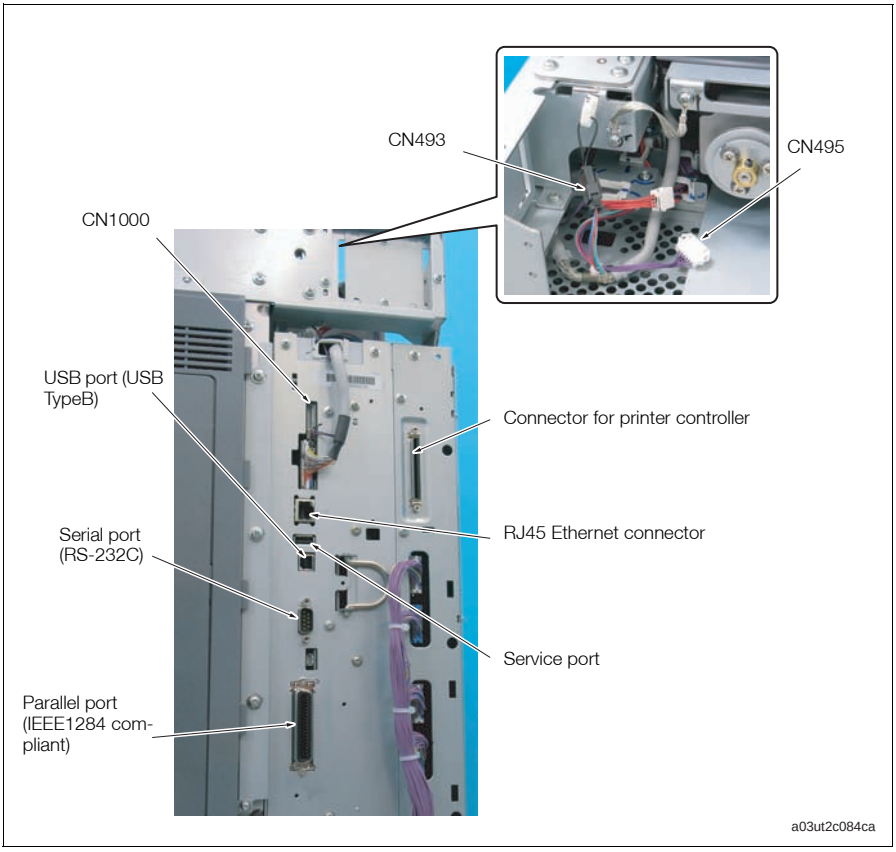
- When the temperature of the fusing roller /Lw [2] detected by the temperature sensor /2 (TEMS/2) rises higher than a specified temperature, and the difference between the detected and the specified temperatures exceeds a predetermined level, the fusing fan /Lw (M65) [4] turns on and cools down the fusing roller /Lw.
- While the M65 is operating, the fusing heater lamp /4 is kept off.
- The fusing fan /Lw (M65) takes in air from the front side, through the duct [3] to cool the fusing roller /Lw.
- Air that passed through the fusing roller /Lw is exhausted to the rear side through the duct [1].



[1] Duct
[2] Fusing roller /Lw
[3] Duct
[4] M65

22. INTERFACE SECTION

22.1 Configuration



22.2 Application

Type	Application
Connector for printer controller	For IC-303/IC-408
RJ45 Ethernet connector	For network
Service port	For mouse, keyboard/for USB memory ISW
USB port (USB TypeB)	For ISW of copier/printer
Serial port (RS-232C)	For CS Remote care
Parallel port	For ISW of copier/printer
CN1000 (Overall control board (OACB))	For consolidation vendor connection
CN493	For key counter (KCT) connection
CN495	For status indicator light

23. IMAGE STABILIZATION CONTROL

23.1 Outline

- This unit carries out various image stabilizing controls in order to achieve stable high print quality.
- The image stabilizing controls carried out during printing are different from those carried out when the sub power switch (SW2) is turned on.

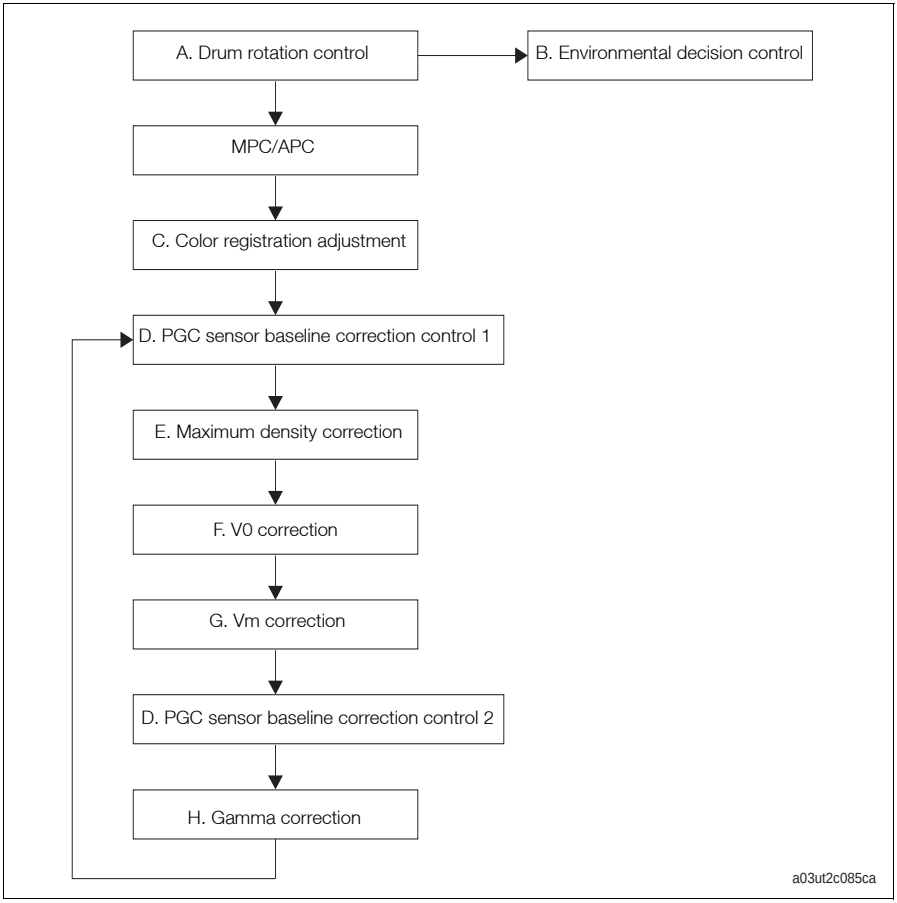
23.2 Operation flow

23.2.1 Image stabilizing controls when the sub power switch (SW2) is ON, during printing, and during idling

An operation flow when the sub power switch (SW2) is ON, during printing, and during idling is described in the figure below.

When the sub power switch (SW2) is turned ON: Carries out the controls from A to H.

During printing and idling: Carries out the controls from D to H.



A. Drum rotation control

(1) Purpose

- To prevent uneven electrostatic charges on the drum, which causes improper images under high humidity conditions.
- To prevent unevenness in density caused by the difference in sensitivity between the part that the cleaner or the developer is applied to and other parts when leaving them in low/normal humidity conditions.

(2) Operation

- Rotates the drum for approx. 4 min and 30 sec during warm-up if the fusing temperature is 50 degrees C or less when the sub power switch (SW2) is turned ON .
- Performs the following operations based on the environmental decision if the fusing temperature is more than 50 degrees C when the SW2 is turned ON.
  If the product is not ready to print one minute after turning the SW2 on under high humidity conditions, the drum is rotated for 4 min and 30 sec. On the other hand, if the fusing warm-up is completed within one minute after turning the SW2 on, the drum is not rotated. Under low/normal humidity conditions, the drum is rotated slightly at constant intervals based on the humidity and the period of time that the product is left to stand.

B. Environmental decision control

(1) Purpose

- To achieve high print quality, the temperature/humidity sensor detects the environmental temperature and humidity and feed back the findings to the various types of controls to maintain the image at a fixed quality.

(2) Execution timing

- The ambient status is judged using the measurement result of the sensor under the following conditions.
  More than eight hours have passed since turning the sub power switch (SW2) off previous time when turning the SW2 on, and that the fusing temperature is 50 degrees C or below.

C. Color registration adjustment

(1) Purpose

- Performed in order to correct the misalignment in main or sub scanning direction, entire horizontal magnification, and skew.

(2) Operation

- The color registration sensors /Fr and /Rr reads a patch image created on the transfer belt.
- The correction is carried out by calculating the amount of the misalignment from the read value.

(3) Execution timing

- When adjusting in service mode.
- When the sub power switch (SW2) is turned on with the fusing temperature is 50 °C or less.
- Every 1,000 prints.
- When printing is not performed for a predetermined period of time.When the temperature in the write section has changed 10 °C.
- When printing is not performed for one hour after the correction is finished.

D. PGC sensor baseline correction control 1, 2

(1) Purpose

- This correction is necessary to be executed in advance to carry out the maximum density control and the gamma correction control.

(2) Operation

- To carry out the maximum density control, reference values for the PGC sensor (PS11) are determined by measuring the density of the transfer drum surface when no toner is attached on the belt.

(3) Execution timing

- When printing has not been performed for 6 hours or longer.
- Every 1,000 prints.
- When a change in humidity exceeds 20% from the last time the control is performed.
- When turning on the sub power switch (SW2) after replacing the materials.

E. Maximum density correction control

(1) Purpose

- To keep the maximum density constant regardless of the ambient condition and the number of printed pages.

(2) Operation

- The maximum density correction method differs in each color of Y, M, C, and K.
- The correction of Y, M, and C.
  The target value of each toner adhesion stored in the NVRAM board (NRB) is used for the correction.
  A patch image is created on the transfer belt using the maximum exposure level, to be read by the PGC sensor (PS11).
  According to the detected density, a target range of developing bias is calculated and determined for development.
- The correction of K.
  A gradation patch image is created on the transfer belt using the intermediate exposure level, to be read by the PS11.
  According to the detected density, a target range of developing bias is calculated and determined for development.

(3) Execution timing

- When printing has not been performed for 6 hours or longer.
- Every 1,000 prints
- When a change in humidity exceeds 20% from the last time the control is performed.
- When turning on the sub power switch (SW2) after replacing the materials.

F. V0 adjustment

(1) Purpose

- To charge the drums appropriately compensating for deterioration of related parts, and the effects of ambient conditions.

(2) Operation

- A voltage applied to the grid is adjusted so that a target electric potential is obtained. The target potential is determined according to the developing bias calculated at the maximum density correction control.
- The electric potential on the drums are detected by the drum potential sensors; /Y (DPRS/Y), /M (DPRS/M), /C (DPRS/C), and /K (DPRS/K).

(3) Execution timing

- When printing has not been performed for 6 hours or longer.
- Every 1,000 prints.
- When a change in humidity exceeds 20% from the last time the adjustment is performed.
- When turning on the sub power switch (SW2) after replacing the materials.

G. Vm adjustment

(1) Purpose

- To achieve stabilized intermediate exposure potential regardless of a drop in sensitivity of photosensitive materials or the stain of the writing system.

(2) Operation

- While the drums are irradiated with a PWM128 intensity laser beam, the electric potential on the drums are detected by the drum potential sensor /Y (DPRS/Y), /M (DPRS/M), /C (DPRS/C), and /K (DPRS/K). According to the detected results, the laser MPC value is corrected.

(3) Execution timing

- When printing has not been performed for 6 hours or longer.
- Every 1,000 prints.
- When a change in humidity exceeds 20% from the last time the adjustment is performed.
- When turning on the sub power switch (SW2) after replacing the materials.

H. Gamma correction control

(1) Purpose

- In order to correct print density with respect to the original density according to gamma characteristic of toner images formed on each drum and the transfer belt in relation to the exposure level.

(2) Operation

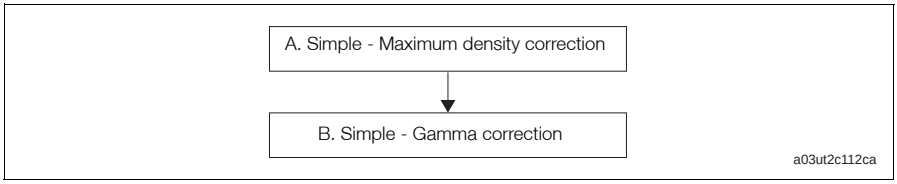
- Patch images are created on the transfer belt, and read by the PGC sensor (PS11).
- The PS11 output level is checked against a predetermined output level with respect to print density, and the gamma is corrected according to the result.

(3) Execution timing

- When printing has not been performed for 6 hours or longer.
- Every 1,000 prints
- When a change in humidity exceeds 20% from the last time the control is performed.
- When turning on the sub power switch (SW2) after replacing the materials.

23.2.2 Image stabilizing controls when selecting the “Stability“ in expert settings

The image stabilizing controls described below is only executed when "Stability" is selected in "Expert adjustment" → "Quality adjustment" → "Image Quality stability".



A. Simple-maximum density correction

(1) Purpose

- To keep the maximum density constant regardless of the ambient condition and the number of printed sheets.

(2) Operation

- Patch images are created on the transfer belt, and read by the PGC sensor (PS11). The PS11 output level is checked against a predetermined output level with respect to print density. The result is reflected to the developing DC bias and the Grid voltage.

(3) Execution timing

- The correction setting is enabled in "Utility" → "Machine Admin. setting" → "System settings" → "Expert adjustment" → "Quality adjustment" → "Image Quality stability".
  When the print/copy job reaches the number of pages that correspond to a level of density selected on the operation panel.

Operation panel setting	-2	-1	normal	+1	+2
Number of print pages	200	100	50	30	10

B. Simple-gamma correction

(1) Purpose

- To correct print density according to gamma characteristic of toner images formed on each drum and the transfer belt in relation to the exposure level.

(2) Operation

- Patch images are created on the transfer belt with the settings selected in the "Menu" → "Qualty adjustment" → " Screen" and read by the PGC sensor (PS11).

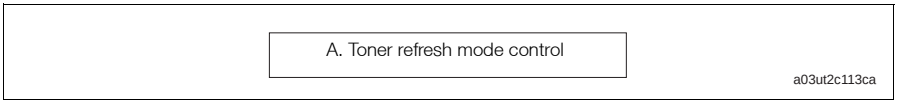
(3) Execution timing

- The correction setting is enabled in the "Utility" → "Machine Admin. setting" → "System settings" → "Expert adjustment" → "Quality adjustment" → "Image Quality stability".
  When the value of simple maximum density correction reaches the value that correspond to a level of gamma correction selected on the operation panel.

Operation panel setting	-2	-1	normal	+1	+2
Simple-maximum density correction value	15	10	8	5	3

23.2.3 Other Image stabilizing controls

The image stabilizing controls described below is only executed when selecting "Stability" on the "Expert adjustment" → "Quality adjustment" → "Image Quality stability" screen.



A. Toner refresh mode control

(1) Purpose

- Printing low coverage images makes the developer (toner) become deteriorated due to agitation with little consumption of developer, and as the result, print quality becomes degraded. To prevent this, the deteriorated toner in the developer is ejected and replaced with new toner.

(2) Operation

a. Manual toner refresh mode

- Develops the amount of toner that equals the consumption for printing 8 papers (A3 size) for each color to eject the deteriorated toner.

b. Automatic toner refresh mode

- Checks the average of print coverage for each color with each specific drive distance of the developing roller /K and consumes a certain amount of toner for the color that the density is lower than 5% converted in A4 size after completion of printing.

	Execution frequency	Refresh quantity
Small	Continuously printing approx. 1,000 sheets in A4 size	Approx. three solid sheets in A4 size
Medium	Continuously printing approx. 500 sheets in A4 size	Approx. five solid sheets in A4 size
Large	Continuously printing approx. 330 sheets in A4 size	Approx. eight solid sheets in A3 size

- The execution frequency varies depending on the environmental temperature and print mode.

(3) Execution timing

a. Manual toner refresh mode

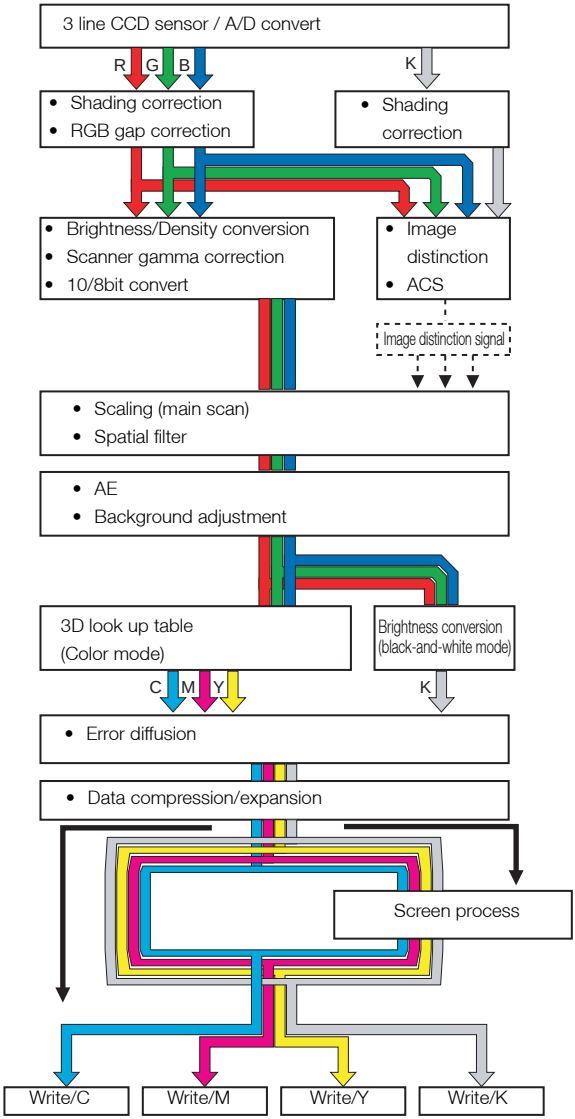
- When selecting the execution of toner refresh mode on the operation panel and returning to the normal screen or when turning on/off the sub power switch (SW2).

b. Automatic toner refresh mode

- There are two types of automatic toner refresh mode; "at job end" and "periodical".
  at job end : Executed when the job is completed.
  periodical: Executed when turning on the power after more than six hours have passed since the power is turned off previous time.

24. IMAGE PROCESSING

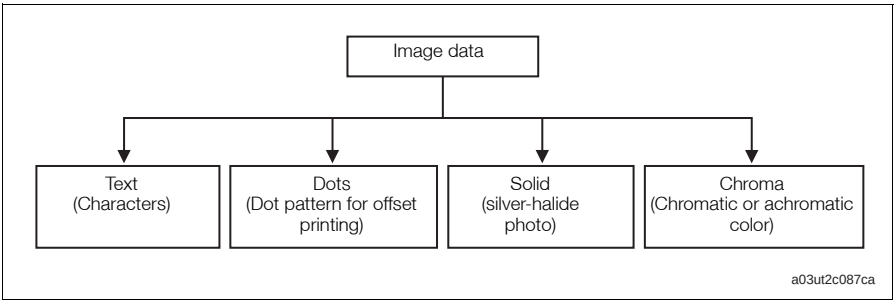
24.1 Operation flow



24.2 Image type classification

A. OUTLINE

- A scanned image type is classified as text, dots, solid or chroma.
- After the classification, gamma curve used for writing the image is changed to the appropriate one for the image type.
- The image classification function works "Text/Photo", "Text", or "Map" is selected in the original setting menu.
- The function does not work when "Photo" is selected.



B. Writing bit and resolution

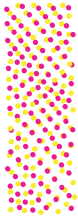
Relations between number of write bit and the resolution by the combination of the display and the image quality is shown in the figure below.

Display of operation panel		Enhance Mode	Writing bit and resolution
Line1		Text/Photo	Text: 8bit 600dpi / Other: Approx. 200lpi screen
		Photo	Approx. 200lpi screen
		Text	1bit ED 600dpi
		Map	1bit ED 600dpi
Line2/ Type1		Text/Photo	Text: 8bit 600dpi / Other: Approx. 180lpi screen
		Photo	Approx. 180lpi screen
		Text	1bit ED 600dpi
		Map	1bit ED 600dpi
Line2/ Type2		Text/Photo	Text: 8bit 600dpi / Other: Approx. 135lpi screen
		Photo	Approx. 135lpi screen
		Text	1bit ED 600dpi
		Map	1bit ED 600dpi
Dot1		Text/Photo	Text: 8bit 600dpi / Other: Approx. 190lpi screen
		Photo	Approx. 190lpi screen
		Text	1bit ED 600dpi
		Map	1bit ED 600dpi
Dot2/ Type1		Text/Photo	Text: 8bit 600dpi / Other: Approx. 200lpi screen
		Photo	Approx. 200lpi screen
		Text	1bit ED 600dpi
		Map	1bit ED 600dpi
Dot2/ Type2		Text/Photo	Text: 8bit 600dpi / Other: Approx. 140lpi screen
		Photo	Approx. 140lpi screen
		Text	1bit ED 600dpi
		Map	1bit ED 600dpi
compression	Gives priority to lessening color scanned data	Text/Photo	1bit ED 600dpi
		Photo	
		Text	
		Map	

(1) Print image using 8bit, 1bit ED

Original image	Print image

(2) Print image using 200lpi or 140lpi screen

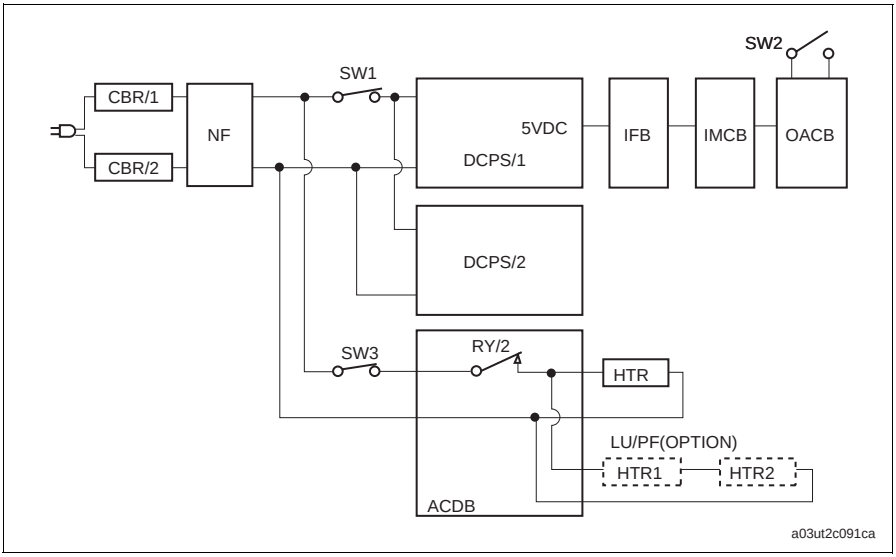
Original image	Print image Line screen	Print image Dot screen
		

25. OTHER CONTROLS

25.1 Power On control

25.1.1 Parts that operate when the main power switch (SW1) is turned on

A. Configuration

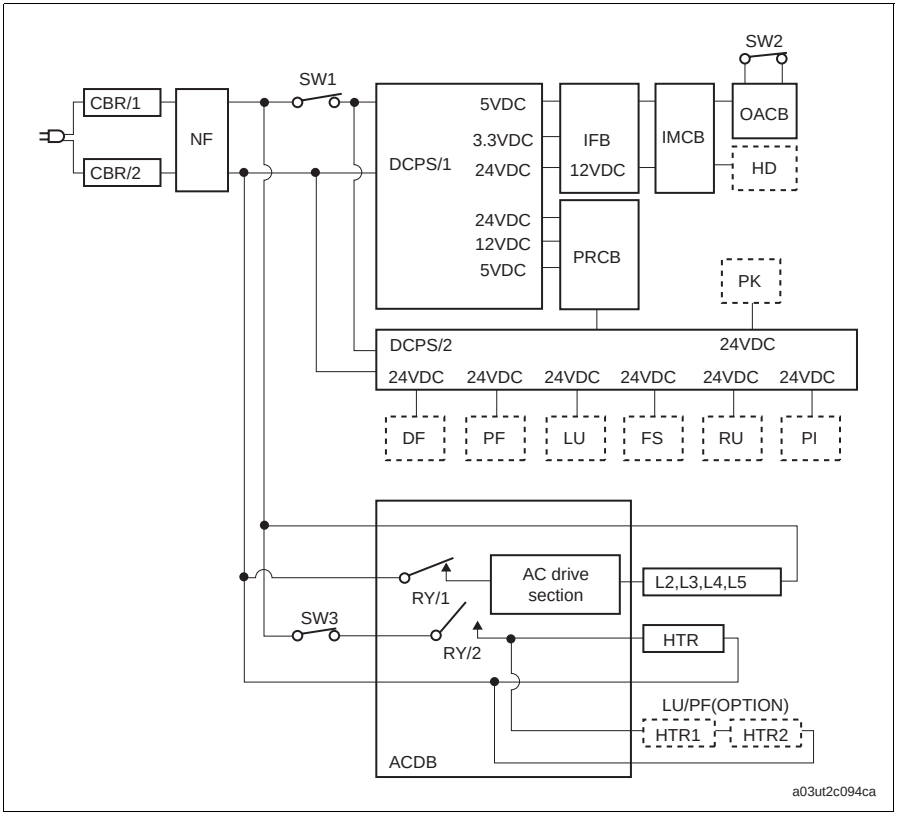


B. Operation

- When the main power switch (SW1) turns ON, AC power is supplied to the DC power unit /1 (DCPS1), /2 (DCPS/2).
- Then, 5VDC is distributed to the overall control board (OACB) through the I/F board (IFB) and the image memory control board (IMCB).

25.1.2 Parts that operate when the sub power switch (SW2) is turned on

A. Configuration

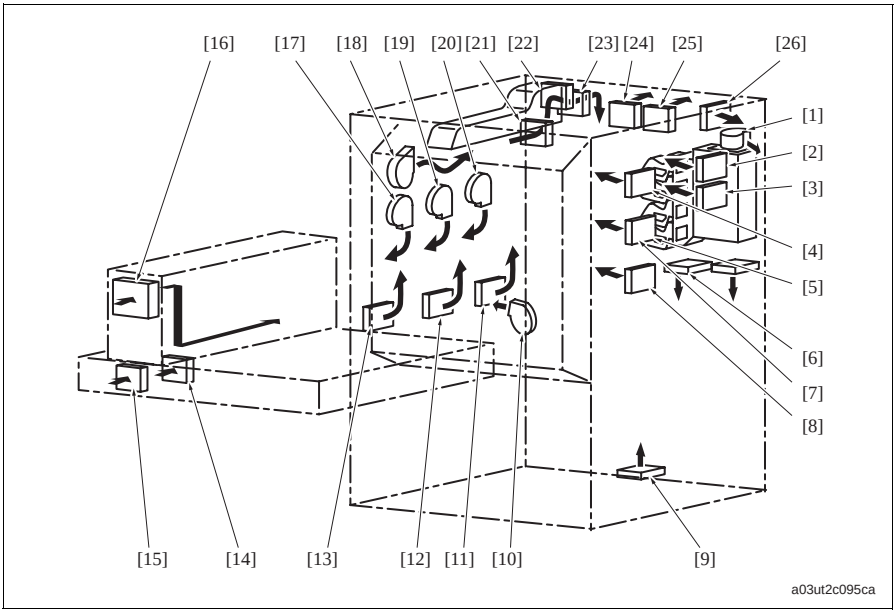


B. Operation

- When the sub power switch (SW2) turns ON, the overall control board (OACB) sends a control signal to the DC power unit /1 (DCPS/1) via the image memory control board (IMCB) and the I/F board (IFB).
- DCPS /1 generates voltages of 3.3VDC, 5VDC, 12VDC, 24VDC, and distributes them to the printer control board (PRCB) and other control boards.
- Then, the PRCB sends a control signal to the DC power unit /2 (DCPS/2) in order to make the unit generate 24 VDC is supplied to the all driver boards and option units.
- Main relay (RY/1) turns ON to supply AC power to the fusing heater lamp /1 (L2), /2 (L3), /3 (L4) and /4(L5), and the initial operation is performed.
- The sub relay (RY/2) turns OFF to shut off the AC power to the dehumidifier heater (HTR), the dehumidifier heater /1 inside the PF/LU (HTR1), and the dehumidifier heater /2 (HTR2) (PF only).

25.2 Fan control

25.2.1 Configuration



[1] Main unit fan (M47)
[2] Developing fan /1 (M45)
[3] Developing fan /2 (M46)
[4] Writing suction fan /1 (M43)
[5] IPB fan /2 (M25)
[6] IPB fan /1 (M24)
[7] Developing fan /3 (M64)
[8] Writing suction fan /2 (M44)
[9] Power supply fan (M42)
[10] Charging air suction fan (M48)
[11] Tucking fan /1 (M26)
[12] Tucking fan /2 (M27)
[13] Tucking fan /3 (M28)
[14] ADU fan /2 (M67)
[15] ADU fan /1 (M66)
[16] Fusing fan /Lw (M65)
[17] Paper exit fan /1 (M61)
[18] Transfer belt fan (M11)
[19] Paper exit fan /2 (M62)
[20] Paper exit fan /3 (M63)
[21] Fusing belt ventilation fan (M10)
[22] Deodorization fan (M36)
[23] Fusing ventilation fan (M37)
[24] Drum fan /1 (M12)
[25] Drum fan /2 (M13)
[26] Scanner fan (M2)

25.2.2 Operation

A. Scanner fan (M2) control

(1) Purpose

- To cool the scanner section.

(2) ON timing

- Starts to operate upon starting of scanning.
  During DF scan, however, the fan keeps operating.

(3) OFF timing

- Stops to operate upon completion of scanning.

B. Fusing belt ventilation fan (M10) control

(1) Purpose

- To cool around the fusing section near the paper exit.

(2) Low/high speed switch timing

- Rotates at low speed during standby.
- Switches to high speed upon starting of printing.
- Switches to low speed for a predetermine time period after printing is finished.

C. Transfer belt fan (M11) control

(1) Purpose

- To cool around the transfer belt.

(2) ON timing

- Starts to operate upon starting of printing.

(3) OFF timing

- Stops a predetermined time period after printing is finished.

D. Drum fan /1 (M12), /2 (M13) control

(1) Purpose

- Exhaust the heat around the drum motor/developing motor.

(2) ON timing

- Starts to operate upon starting of printing.

(3) OFF timing

- Stops a predetermined time period after printing is finished.

E. IPB fan /1 (M24), /2 (M25) control

(1) Purpose

- To cool around the image processing board (IPB).

(2) ON timing

- Rotates at low speed during standby.
- Starts to operate upon starting of printing.
- Starts to operate upon starting of scanning.
- Starts to operate upon starting of HDD operation.

(3) OFF timing

- Starts to operate upon completion of printing.
- Starts to operate upon completion of scanning.
- Starts to operate upon completion of HDD operation.

F. Tucking fan/1 (M26), /2 (M27), /3 (M28) control

(1) Purpose

- To cool around the reverse paper exit section and the paper.

(2) ON timing

- Stops during printing front side of double side print.
- Starts to operate upon starting of printing back side of double print or single print.

(3) OFF timing

- Stops when the single print counter reaches a predetermined level.

G. Deodorization fan (M36) control

(1) Purpose

- To cool around the fusing section.

(2) Low/high speed switching timing

- Rotates at low speed during standby.
- Switches to high speed upon starting of printing.
- Switches to low speed a predetermine time period after printing is finished.

H. Fusing ventilation fan (M37) control

(1) Purpose

- To cool around the fusing section.

(2) Low speed/fast switch timing

- Rotates at low speed during standby.
- Switches to high speed upon starting of printing.
- Switches to low speed a predetermine time period after printing is finished.

I. Power supply fan (M42) control

(1) Purpose

- To cool the DC power unit /1 (DCPS/1), /2 (DCPS/2).

(2) Low/high speed switching timing

- Rotates at low speed during standby.
- Switches to high speed upon starting of printing.
- Switches to low speed a predetermine time period after printing is finished.

J. Writing suction fan /1 (M43), /2 (M44) control

(1) Purpose

- To cool the polygon motor and the writing optical parts.

(2) ON timing

- Rotates at high speed during standby and printing.
- The number of revolutions during standby can be set using software DIPSW.

K. Developing fan /1 (M45), /2 (M46), /3 (M64) control

(1) Purpose

- To cool around the developing section.

(2) ON timing

- Starts to operate upon starting of the developing motor /Y (M14), developing motor /M (M15), developing motor /C (M16) and developing motor /K (M17).

(3) OFF timing

- Stops a predetermined time period after printing is finished.
- The predetermined time period differs depending on the ambient humidity. (5 minutes 30 seconds at max.)

L. Main unit fan (M47) control

(1) Purpose

- To cool around the drum section.

(2) ON timing

- Starts to operate upon starting of the developing motor /Y (M14), developing motor /M (M15), developing motor /C (M16) and developing motor /K (M17).

(3) OFF timing

- Stops a predetermined time period after printing is finished.
- The predetermined time period differs depending on the ambient humidity. (5 minutes 30 seconds at max.)

M. Charging air suction fan (M48) control

(1) Purpose

- To cool around the charging coronas.

(2) ON timing

- Starts to operate upon starting of charging.
- Starts to operate upon starting of image stabilization control.

(3) OFF timing

- Stops a predetermined time period after printing is finished.
- Stops a predetermined time period after finishing the image stabilization control.

N. Paper exit fan /1 (M61), /2 (M62), /3 (M63) control

(1) Purpose

- To cool the exited paper to prevent unevenness of wax on the paper surface.

(2) ON timing

- Starts to operate upon starting of printing.

(3) OFF timing

- FS connected : Stops a predetermined time period after the FS paper exit sensor turns off.
- FS disconnected: Stops a predetermined time period after the main unit paper exit sensor (PS13) turns off.

O. Fusing fan/Lw (M65) control

(1) Purpose

- To cool the fusing roller /Lw.

(2) ON timing

- Starts to operate when the temperature of the fusing roller /Lw rises higher than a prescribed level exceeding the allowable range.
- The M65 and the fusing heater lamp /4 (L5) do not turn ON at the same time.

(3) OFF timing

- Stops when the temperature of the fusing roller /Lw drops to a prescribed level.

P. ADU fan /1 (M66) control

(1) Purpose

- To cool around the ADU.

(2) ON timing

- Starts to operate upon starting of printing in double side or reverse paper exit mode.

(3) OFF timing

- Stops a predetermined time period after printing is finished.

Q. ADU fan /2 (M67) control

(1) Purpose

- To cool the ADU loop motor (M57) and the ADU reverse motor (M32).

(2) ON timing

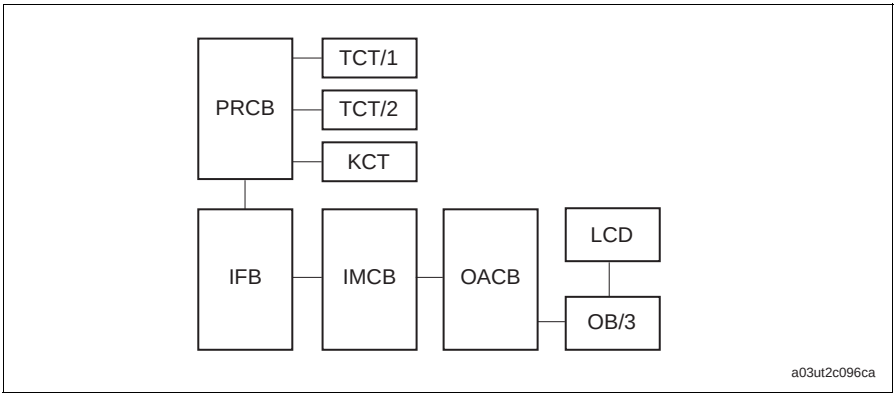
- Starts to operate upon starting of printing in double side or reverse paper exit mode.

(3) OFF timing

- Stops a predetermined time period after printing is finished.

25.3 Counter control

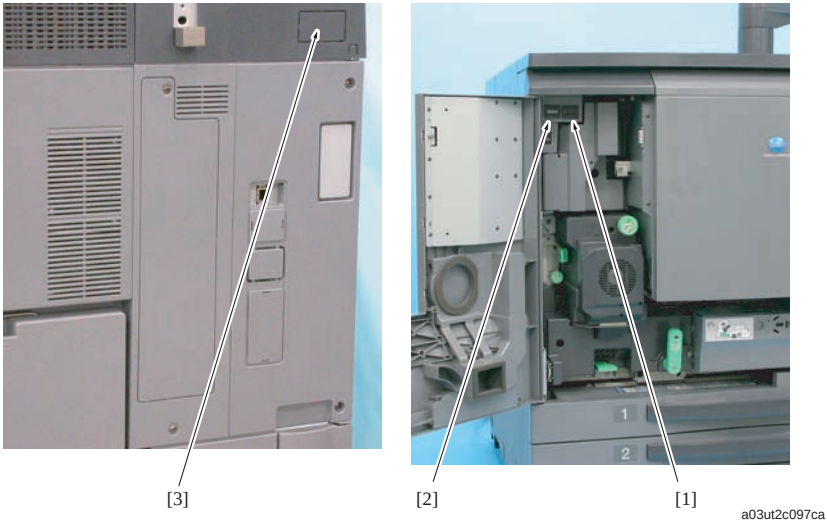
25.3.1 Structure of counter



25.3.2 Counter operation

Item	Specification/mechanism
Total counter /1 (TCT/1)	• Display the total number of printed sheets in all print modes. • Mechanical counter driven by electrical signals. • Counts up by paper exit signal.
Total counter /2 (TCT/2)	• Display the total number of printed sheets in black-and-white print modes. • Mechanical counter driven by electrical signals. • Counts up by paper exit signal.
Electrical counter	• Display the total number of printed sheets on the LCD board (LCDB). • Data collection *1 • Counts up by paper exit signal, and stores the data in NVRAM board (NRB).
For key counter (KCT) Option	• Counter to disable copy operation when count up to the set print number. (removable) • Mechanical counter driven by electrical signals.

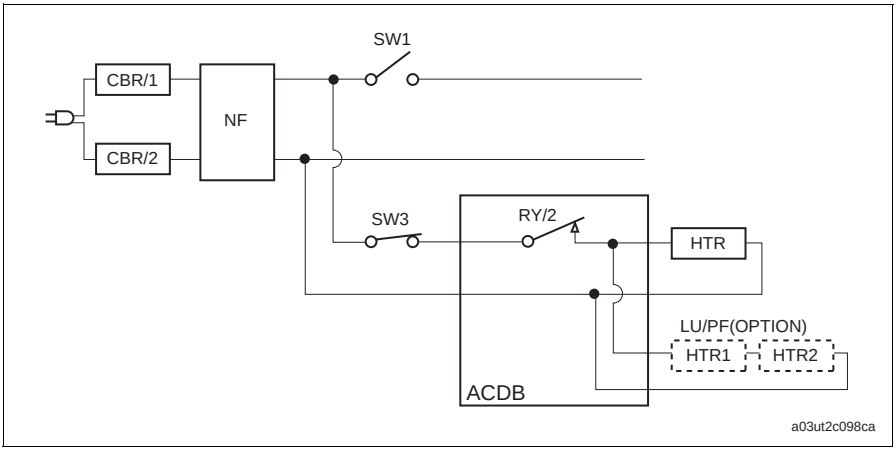
*1 Refer to "10.6 Counter/data" in the main unit field service manual for information on the collected data. (See P.314)



[1] Total counter /1 (TCT/1)
[2] Total counter /2 (TCT/2)
[3] Key counter (KCT)

25.4 Dehumidifier heater control

A. Configuration



B. Operation

- The dehumidifier heater switch (SW3) supplies AC power to the sub relay (RY/2) inside the AC drive board (ACDB).
- When the main power switch (SW1) is OFF, the RY /2 can transmit the AC power to the dehumidifier heater (HTR) and the dehumidifier heater /1 (HTR1), dehumidifier heater /2 (HTR2) (PF only) inside the LU (option).
- Then, if SW3 is turned ON when SW1 is turned off, AC power can be supplied to HTR or HTR1/HTR2.
- When the SW1 and the sub power switch (SW2) are turned on, 24VDC is supplied to the ACDB and the RY/2 is disconnected. Since the AC power line to the HTR and the HTR1/HTR2 is shut off with the RY /2, the power is not supplied to the heaters even when the SW3 is turned on.

25.5 ACS control

25.5.1 Switching from the color mode to the black-and-white mode

A. OUTLINE

- If more than 5 black-and-white sheets are fed consecutively from the DF in which both the color sheets and the black-and-white sheets are stored, the pressure on the first transfer rollers /Y/M/C are released and it shifts to the black-and-white mode.
- At this time, the switch is performed during the job, so there is a time lag between the color print and the black-and-white print.

B. Switching sequence from the color mode to the black-and-white mode

1. The second transfer for the previous print sheet (color) is complete.
2. A pressure is applied only to the first transfer roller /K (the first transfer rollers /Y/M/C are in release state).
3. Writing/K is started.
4. The operation of the drum unit /Y/M/C, the developing unit /Y/M/C, and the toner supply unit /Y/M/C are canceled.

C. Switching sequence from the black-and-white mode to the color mode

1. A color print job is detected.
2. The second transfer for the previous print sheet (black-and-white) is complete.
3. The operation of the drum unit /Y/M/C, the developing unit /Y/M/C, and the toner supply unit /Y/M/C are started.
4. MPC or APC is executed for the write unit /Y/M/C.
5. A pressure is applied to the first transfer roller /Y/M/C/K.
6. Writing /Y is started.

25.5.2 Count when using ACS

- There are two kinds of print count when using ACS.

A. The black-and-white mode (the first transfer roller /Y/M/C is in the release state)

	Black-and-white original
Total count	Counts as black-and-white
Developer counter	Counts as black-and-white

B. The color mode (the first transfer roller /Y/M/C/K is in the pressure state)

	Color original	Black-and-white original
Total count	Counts as color	Counts as black-and-white
Developer counter	Counts as color	Color count *1

*1 When the original is black-and-white, the output will be black-and-white; however, the developer counter counts it as color print and the total counter counts it as black-and-white print.

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

DF-609

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

2006/09	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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DF-609

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Blank page

■ OUTLINE

1. PRODUCT SPECIFICATIONS

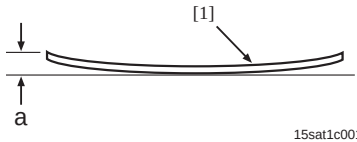
A. Type

Type	Belt conveyance type original auto feeder

B. Functions

Original size	A3, B4, A4, A4S, B5, B5S, A5, A5S, B6S 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½, 5½ x 8½S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS
Max. original size	297 x 431.8mm
Min. original size	128 x 139.7mm • Various sizes of paper can be accommodated

C. Original type

Paper type	Plain paper	High quality paper of 35 to 210 g/m^2 (single side) High quality paper of 50 to 210 g/m^2 (double side) Paper of less than 49g/m^2: conveyed in thin paper mode Paper of more than 129g/m^2: conveyed in thick paper mode
	Special paper	Same as plain paper. However, paper feed and conveyance performance are not guaranteed. • Recycled paper, coarse paper, thermal paper, binding-holed paper, user-defined paper, paper with smooth surface, paper with rough surface, and paper with folds Following types of special paper cannot be used. • OHP film, blueprint master paper, label paper, off-set master, bonded original, high quality paper (paper weight: Less than 34g/m^2 or more than 211g/m^2)
Paper curl amount	Up to 10 mm with 5 originals overlapped one another  15sat1c001na a Curing: 10 mm or less [1] Original	
Max. tray capacity	100 sheets (80g/m^2 paper)	

Scan speed (8½ x 11)	Single-sided mode (including thin-paper mode): 39 sheets/min. Double-sided mode (including thin-paper mode): 26 sheets/min. Single-sided mode (thick-paper mode): 28 sheets/min. Double-sided mode (thick-paper mode): 14 sheets/min.
Scanning system	After the original that is conveyed on the belt stops, the scanner moves and scans the original.

D. Machine data

Power source	24/5V DC (supplied from the main body)
Power consumption	Max. 60W or less
Weight	Approx. 14.5kg
Dimensions	588 (W) x 519 (D) x 135 (H) mm (Excluding paper feed tray)

E. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

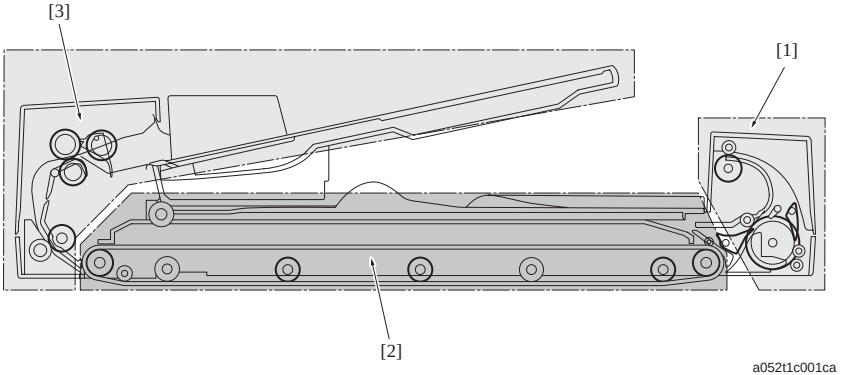
F. Operating environment

Temperature	10 to 30 °C
Humidity	10 to 80%RH (with no condensation)

Note

- **The information herein may be subject to change for improvement without notice.**

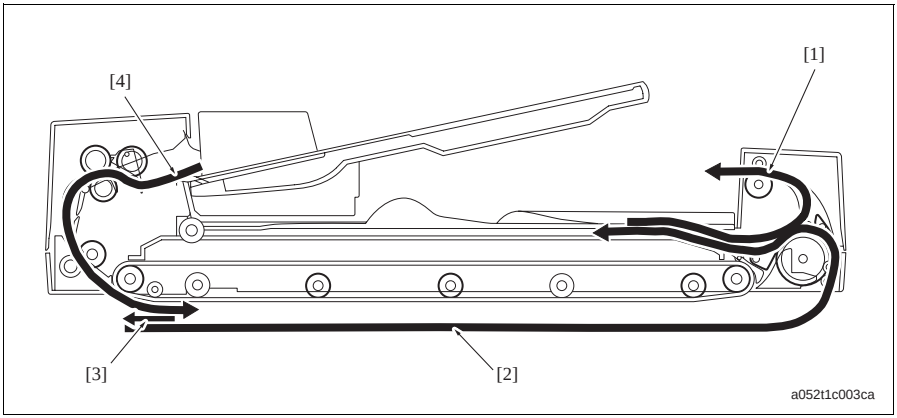
2. UNIT CONFIGURATION DIAGRAM



[1] Reverse/paper exit section
[2] Conveyance section
[3] Paper feed section

3. PAPER PATH

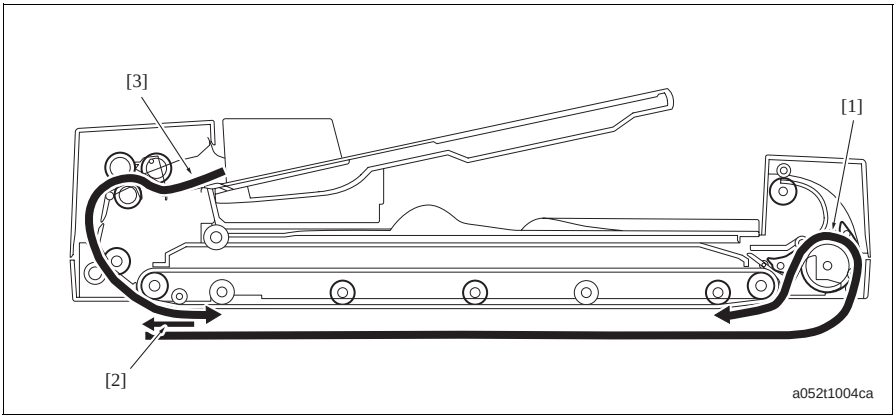
3.1 Single-sided mode



[1] Reverse/paper exit
[2] Conveyance to the reverse stacker
[3] Swing-back
[4] Paper feeding

3.2 Double-sided mode

A. Double-sided mode (front side scan)

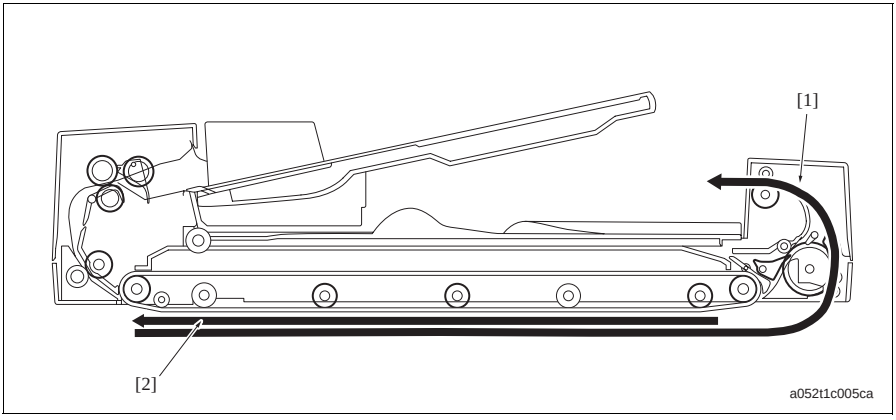


[1] Reverse conveyance/back side

[2] Position shift in front side scanning (swing-back)

[3] Paper feeding

B. Double-sided mode (back side scan)



[1] Paper exiting

[2] Conveyance to the back side scanning position

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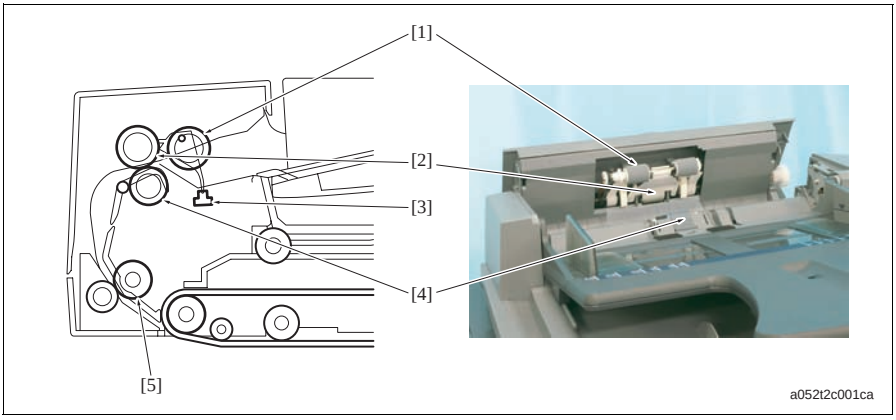
■ CONFIGURATION/OPERATION

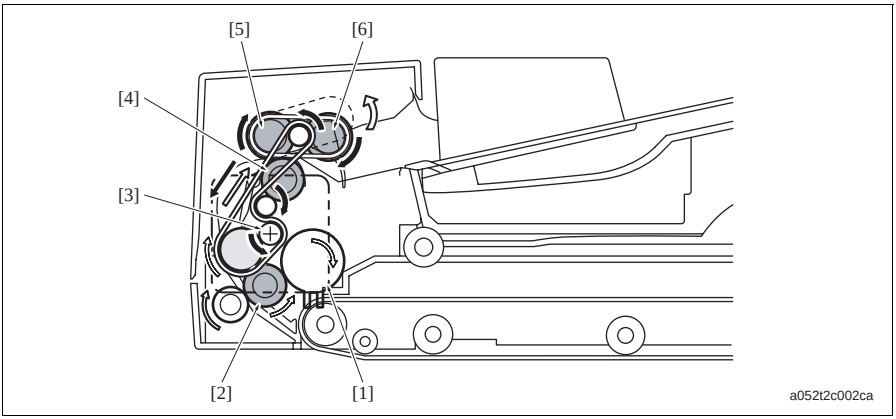
4. PAPER FEED SECTION

4.1 Configuration



[1] Pick-up roller
[2] Paper feed roller
[3] No paper sensor
[4] Separation roller
[5] Registration roller

4.2 Drive

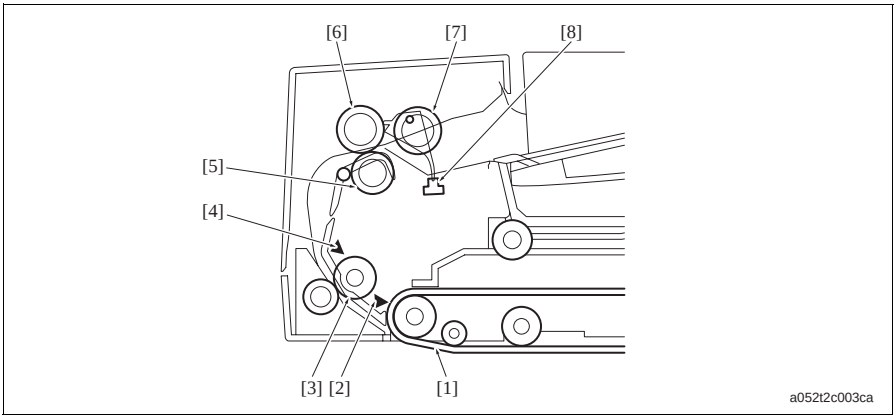


[1] Registration clutch (MC301)
[2] Registration roller
[3] Paper feed motor (M301)
[4] Separation roller (with torque limiter)
[5] Paper feed roller (with one-way clutch)
[6] Pick-up roller

4.3 Operation

4.3.1 Paper feed control

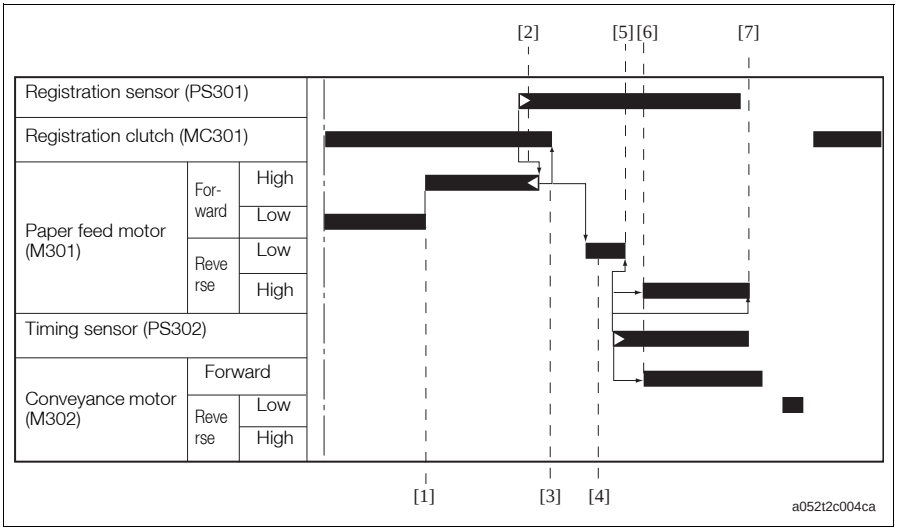
- The pick-up roller [7], paper feed roller [6], and registration roller [3] are driven by the paper feed motor (M301).
- M301 drives in both directions, forward and reverse. When it drives in forward, the pick-up roller and the paper feed roller rotate to transfer papers, while the registration roller does not rotate.
- When M301 drives in reverse, only the registration roller rotates to feed papers while the pick-up roller goes up to the shelter, and one-way clutch keeps the paper feed roller from rotating.
- The separation roller, which is not driven by the motor, is provided with a torque limiter. When a piece of paper is transferred, the separation roller moves in synchronization with the paper feed roller. On the other hand, when two or more papers are fed, the separation roller remains stationary and separates the papers.
- The registration clutch (MC301) functions as the brake to stop the registration roller, not to turn ON or OFF the drive force transmission.
- The registration sensor (PS301) [4] and the timing sensor (PS302) [2] detect the timing of the original.



[1] Conveyance belt
[2] PS302
[3] Registration roller
[4] PS301
[5] Separation roller
[6] Paper feed roller
[7] Pick-up roller
[8] No paper sensor (PS304)

A. Single-sided mode

1. The paper feed motor (M301) switches to high speed [1] and the pick-up roller is pressed against the originals set to the original feed tray.
2. The pick-up roller conveys the originals to the paper feed roller and the separation roller.
3. The paper feed roller conveys a piece of original at the top, and the separation roller keeps the rest of the originals from being transferred.
4. The original is conveyed until it hits the registration roller, and the original forms a loop to correct skew [2].
5. M301 pauses after the specified time, and the registration clutch (MC301) turns OFF to release the registration roller [3].
6. After the specified time, M301 rotates in reverse at low speed and the registration roller nips the original [4].
7. After the specified time has elapsed from when the timing sensor (PS302) has turned ON, M301 is turned off once [5] and starts rotating again in reverse at high speed [6] at the same time as the conveyance motor (M302) is turned on. Then the original is conveyed to the conveyance belt of the conveyance section.
8. After the specified time has elapsed from when PS302 has turned ON, M301 turns off [7].
9. The rest of the originals are conveyed in the same manner.



[1] Paper feed motor high-speed ON

[2] Loop formation

[3] Registration roller released

[4] Nipping by the registration roller

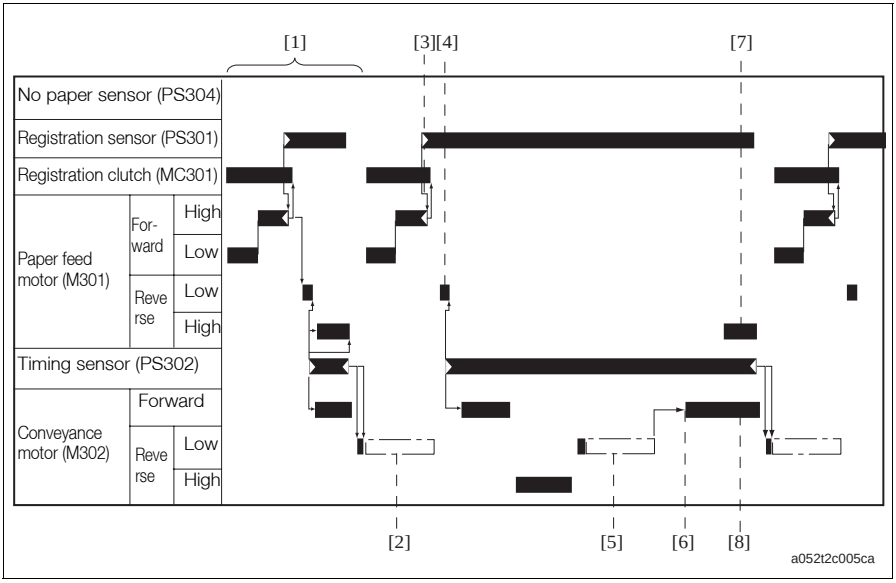
[5] A pause (M301)

[6] Start conveying the original to the conveyance section

[7] Conveyance to the conveyance section completed

B. Double-sided mode

1. The first sheet of original is conveyed in the same manner as in single-sided mode. [1]
2. While front side of the first sheet is being scanned [2], the second sheet is conveyed from the tray and is formed a loop to corrected its skew [3], and the registration roller nips the original [4].
3. When paper exit operation starts [6] after the back side scan [5] of the first sheet is completed, the second sheet on standby at the registration roller is conveyed to the conveyance section by the paper feed motor (M301) [7] and the conveyance motor (M302) [8].



[1] First sheet conveyance

[2] Front side scanning of first sheet

[3] Loop formation of the second sheet

[4] Nipping by the registration roller

[5] Back side scanning of first sheet

[6] Start conveying of the first sheet for paper exit

[7] Conveyance of the second sheet (M301)

[8] Conveyance of the second sheet (M302)

4.3.2 Original size detection

- Original size detection signal is detected by scanning in the main direction and sub direction.
- The original size detection method differs between normal copy mode and mixed original copy mode.

A. Normal copy mode

- Main scan direction is detected by the resistance value of the size VR (VR301) interlocked with the guide plate position on the paper feed tray
- Sub-scanning direction is detected by the combination of the size sensor/S (PS309) and size sensor/L (PS310) when they are turned on and off.

B. Mixed original copy mode

- Maximum original size in main scan direction is detected by the resistance value of the size VR (VR301) interlocked with the guide plate position on the paper feed tray.
- Sub scan direction is detected by the time when the original passes by the timing sensor (PS302).
- Allowed size combinations are as shown in the table below.

For metric area

Other originals	Standard originals (max. original size detected by guide plate)								
	A3	A4	B4	B5	A4S	A5	B5S	A5S	B6S
A3	□	○	—	—	—	—	—	—	—
A4	○	□	—	—	—	—	—	—	—
B4	◎ × Thick paper	◎ × Thick paper	□	○	—	—	—	—	—
B5	◆	◆	○	□	—	—	—	—	—
A4S	◆ × Thick paper	◆ × Thick paper	◎ ◆ Thick paper	◎ ◆ Thick paper	□	○	—	—	—
A5	◆	◆	◆	◆	○	□	—	—	—
B5S	×	×	◆	◆	◎ ◆ Thick paper	◎ ◆ Thick paper	□	—	—
A5S	× *1	× *1	×	×	×	×	◎	□	—
B6S	× *2	× *2	×	×	×	×	×	◆	□

For inch area

Other originals	Standard originals (max. original size detected by guide plate)					
	A3	A4	B4	B5	A4S	A5
11 x 17	□	○	—	—	—	—
8½ x 11	○	□	—	—	—	—
8½ x 14	◆ × Thick paper	◆ × Thick paper	□	○	○	—
8½ x 11S	◆ × Thick paper	◆ × Thick paper	○	□	○	—
8½ x 5½	◆ × Thick paper	◆ × Thick paper	○	○	□	—
8½ x 5½S	× *1	× *1	×	×	×	□

□ : same size, ○ : same series, ◎ : different series, ◆ : different series (out of guaranteed paper through performance), × : no mixed loading, —: not supported

*1 Detects not as an error but as A4

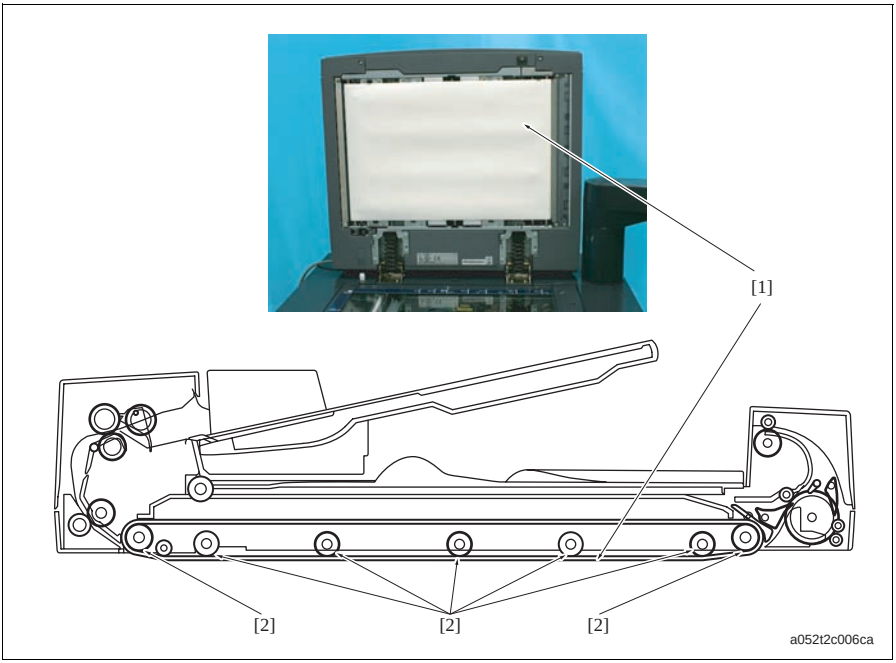
*2 Detects not as an error but as B5

4.3.3 No paper detection

No paper detection signal is detected by the no paper sensor (PS304).

5. CONVEYANCE SECTION

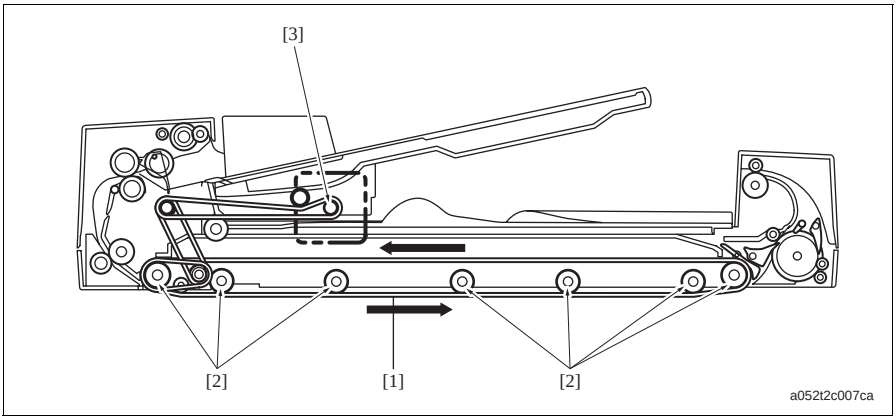
5.1 Configuration



[1] Conveyance belt

[2] Conveyance roller

5.2 Drive



[1] Conveyance belt

[2] Conveyance roller

[3] Conveyance motor (M302)

5.3 Operation

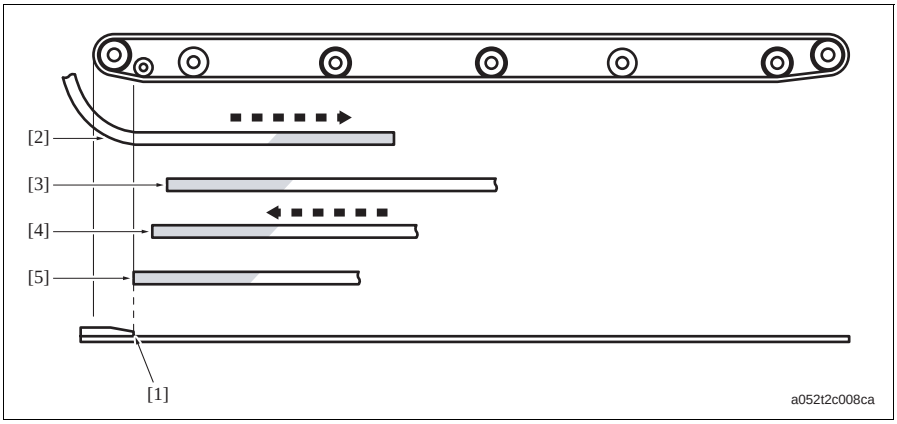
5.3.1 Scanning and conveyance control

- The conveyance belt is driven by the conveyance motor (M302).
- In single-sided mode, a swing-back to position the original for scanning is performed after the original is conveyed from the paper feed section to the conveyance belt.
- In double-sided mode, the original returned from the reverse/paper feed section is conveyed at low speed, and is positioned for scanning.
- Thin paper mode is provided in the original size setting as the positioning control method differs between thin paper and the other papers (plain and thick).

A. Single-sided mode

(1) Swing-back

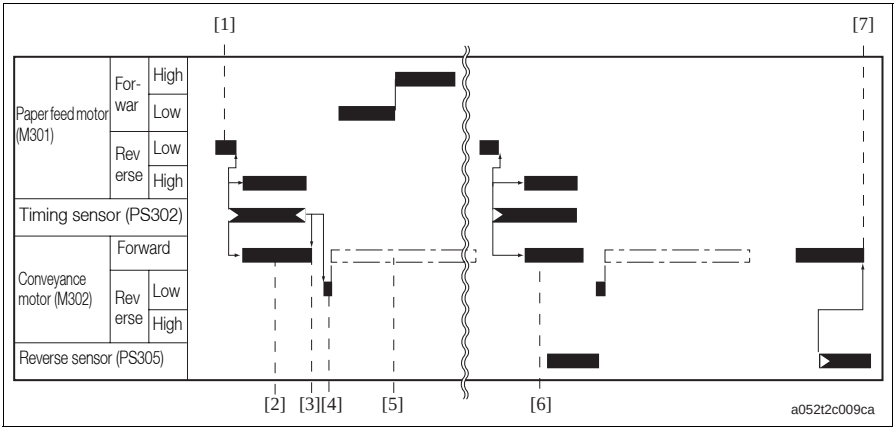
1. The original is conveyed from the paper feed section [2].
2. The original is conveyed [3] to the point that the rear end of the original comes over the positioning plate [1].
3. The conveyance motor (M302) rotates in reverse at low speed and returns the original [4], and the original is stuck against the positioning plate [5].
4. The original is scanned.



[1] Stuck position
[2] Original conveyance
[3] Stops after going through the stuck position
[4] Swing-back
[5] Positioning completed

(2) Control

1. After the registration roller nips the original [1], the original is conveyed [2] from the paper feed section.
2. After the specified time has elapsed from when the timing sensor (PS302) has turned off (Rear end detection), M302 is turned off and the original is conveyed to the point that the rear end of the original comes over the positioning plate, and then the conveyance stops [3].
3. After the specified time, M302 rotates in reverse at low speed and returns the original [4], and the original is stuck against the positioning plate (Swing-back).
4. The scanning is performed in the main body [5].
5. After scanning the second sheet (small size paper) or the first sheet (large size paper), the reverse/paper exit motor (M303) is turned on at the same time as M302. Then the scanned original is conveyed to the reverse/paper exit section [6] while the next original is conveyed to the conveyance section.
6. When the scanning of the last page is completed and after the specified time has elapsed from when the reverse sensor (PS305) is turned on, M302 is turned off [7].



[1] Nipping the original

[2] Conveyance from the paper feed section

[3] Pausing for swing-back

[4] Swing-back

[5] Scanning the original

[6] Conveyance from the paper feed section and paper exit

[7] Conveyance to the reverse/paper exit section completed

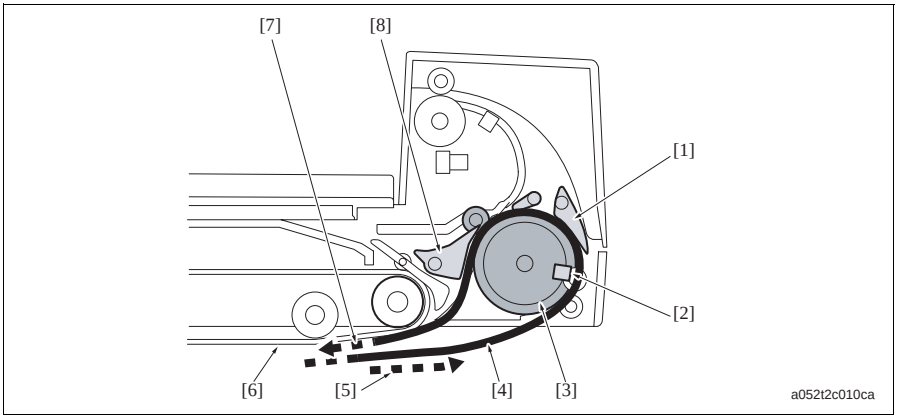
B. Double-sided mode

(1) Operation

- The paper path of the reverse paper exit section is created by the paper exit gate [1] and the reverse gate [8]. Both gates are set by turning off the paper exit solenoid (SD301) and turning on the reverse solenoid (SD302).

1. The front side scan is performed in the same operating method as in the single-sided mode.

2. The original is conveyed to the reverse/paper exit section [5] to perform back side scan by driving the reverse/paper exit motor (M303) and the conveyance motor (M302). At this time, the leading edge of the original (Back side) that is conveyed in reverse [7] overlaps with the rear end of the original (Front side) [4] on the right side of the conveyance belt [6] near the reverse/paper exit section.



[1] Paper exit gate

[2] Reverse sensor (PS305)

[3] Reverse roller

[4] Rear end of the original (Front side)

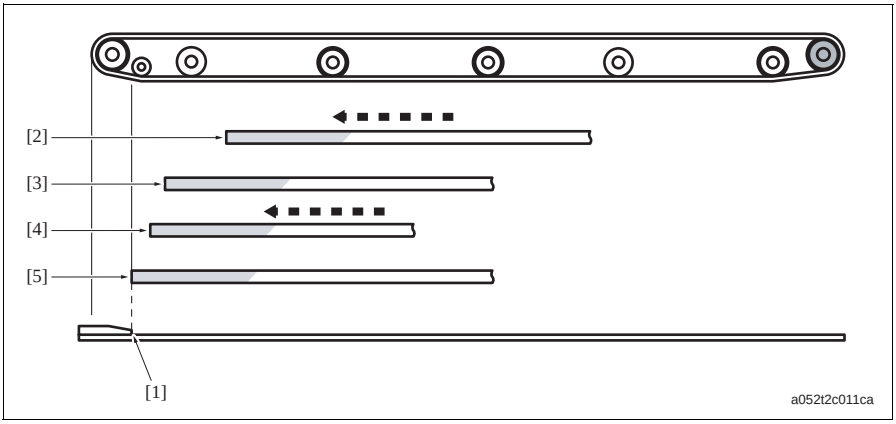
[5] Conveyance direction to the reverse/paper exit section

[6] Conveyance belt

[7] Pushing direction of the scanning section (Back side)

[8] Reverse gate

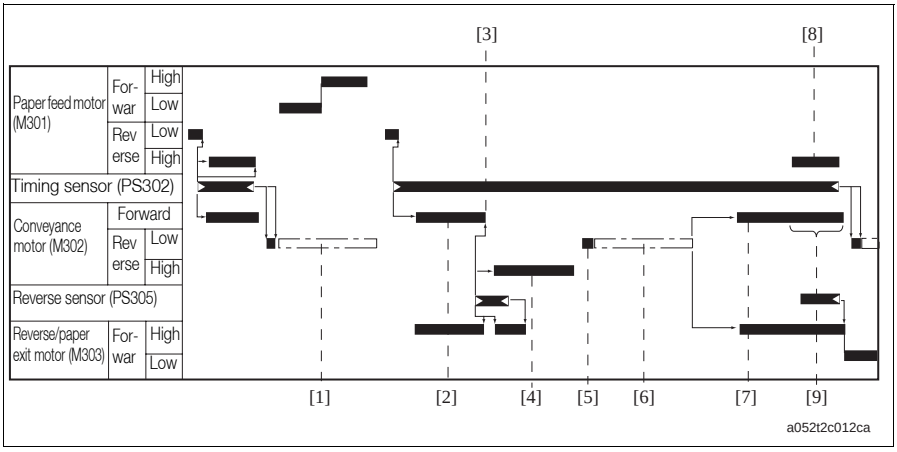
3. While operating the reverse conveyance [2], the original is conveyed at low speed [4] after a short pause [3] and the original is stuck [5] against the positioning plate [1].
4. The back side scan is performed.



[1] Stuck position
[2] Reverse/paper exit from the reverse section
[3] A pause before being stuck against the positioning plate
[4] Pushing at low speed (Reverse conveyance)
[5] Positioning completed

(2) Control

1. The front side scan is performed [1] in the same operating method as in the single-sided mode.
2. M302 starts driving forward at the same time as M303 is turned on. Then the original is conveyed to the reverse/conveyance section [2].
3. After the specified time has elapsed from when the reverse sensor (PS305) has turned on, M302 and M303 turn off [3]. Then only M302 starts rotating again in reverse at high speed [4], and the original is conveyed toward the stuck position (Leftward) by the conveyance belt.
4. M302 pauses [3] after the specified time has elapsed from when M302 has turned on (in reverse at high speed) and switches speed to low speed [5]. Then the original is conveyed to the stuck position against the positioning plate [1].
5. After the positioning is completed, the scanner (main body side) performs scanning.
6. After the back side scan [6] is completed, the paper exit is performed [7] in the same operating method as in single-sided mode.
7. When there are any originals that follow, the paper feed motor (M301) keeps operating to continue the conveyance [9].



[1] Front side scanning

[2] Conveyance to the reverse/paper exit section

[3] A pause to reverse

[4] Reverse

[5] Pushing at low speed (Reverse conveyance)

[6] Back side scanning

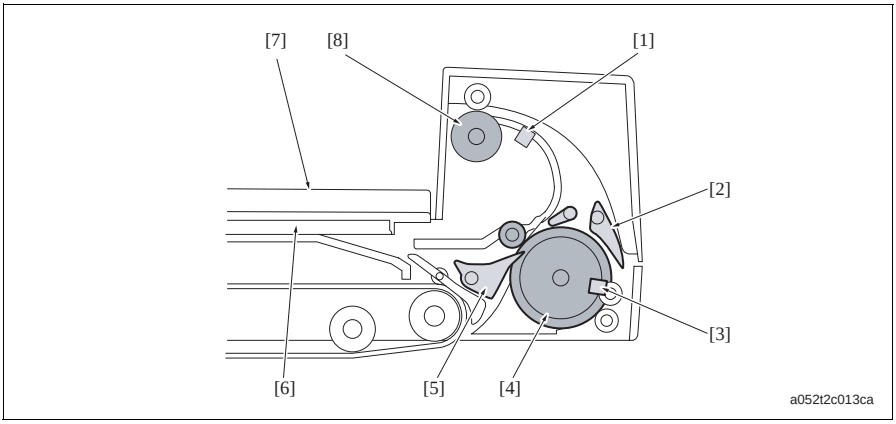
[7] Paper exit

[8] Conveyance of the following originals from the paper feed section

[9] Continued action (paper feeding and exiting operation) of M302

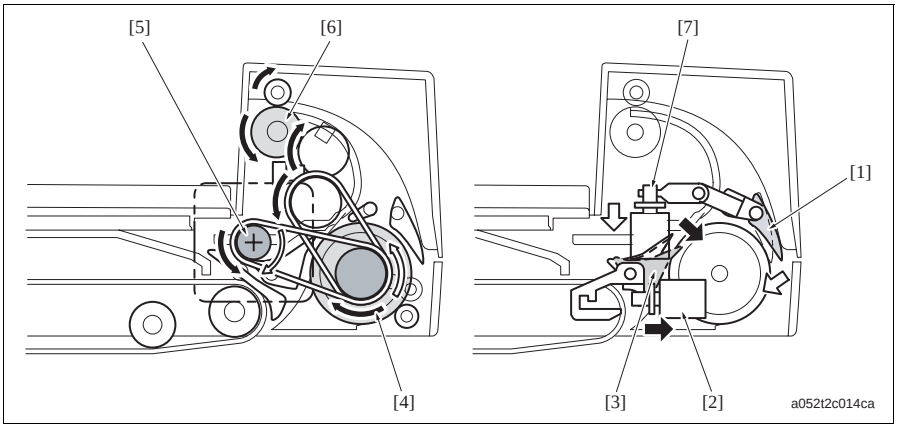
6. REVERSE/PAPER EXIT SECTION

6.1 Configuration



[1] Paper exit sensor (PS306)
[2] Paper exit gate
[3] Reverse sensor (PS305)
[4] Reverse roller
[5] Reverse gate
[6] Reverse stacker
[7] Paper exit stacker
[8] Paper exit roller

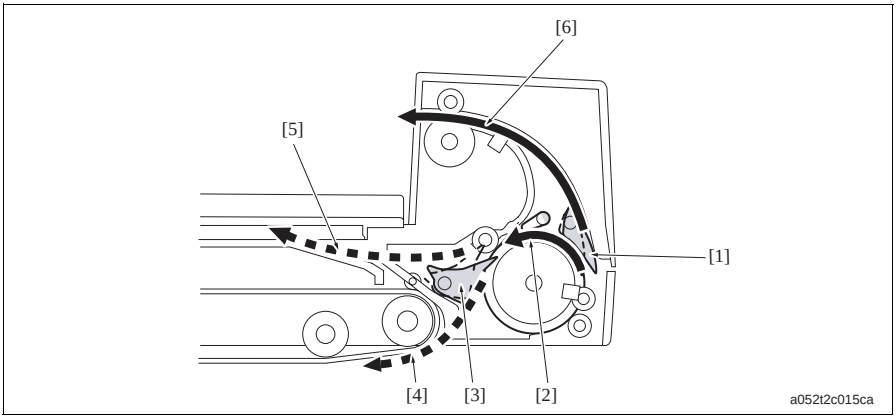
6.2 Drive



[1] Paper exit gate
[2] Reverse solenoid (SD302)
[3] Reverse gate
[4] Reverse roller
[5] Reverse/paper exit motor (M303)
[6] Paper exit roller (with one-way clutch)
[7] Paper exit solenoid (SD301)

6.3 Operation

- The reverse roller and the paper exit roller are driven by the reverse/paper exit motor (M303).
- One-way clutch rotates the paper exit roller only in the paper exit direction when M303 drives both forward and reverse.
- The paper exit gate and the reverse gate switch the path of the reverse paper exit.
- The paper exit gate [1] is driven by the paper exit solenoid (SD301). The path is switched to the reverse path [2] when SD301 is turned off while the path is switched to the straight paper exit path [6] when SD301 is turned on.
- The reverse gate [3] is driven by the reverse solenoid (SD302). The path is switched to the reverse stacker path [5] when SD302 is turned off while the path is switched to the back side reverse path [4] when SD302 is turned on.



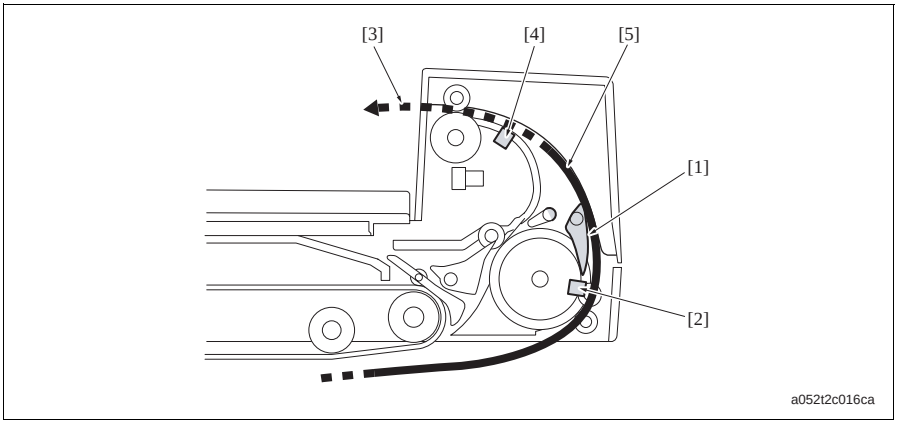
[1] Paper exit gate
[2] Reverse path
[3] Reverse gate
[4] Back side reverse path
[5] Reverse stacker path
[6] Straight paper exit path

6.3.1 Paper exit control

A. Straight paper exit

(1) Operation

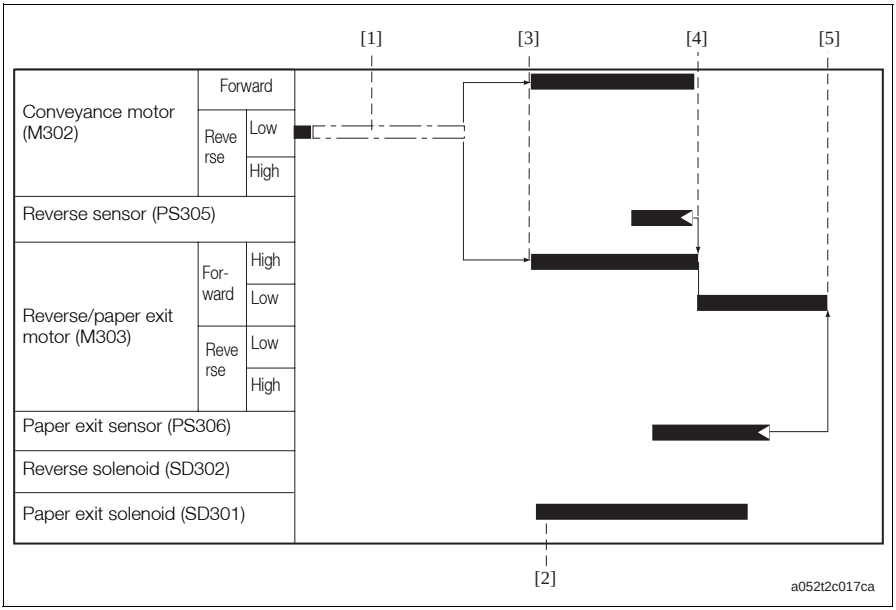
- When the paper exit solenoid (SD301) is turned on, the paper exit gate [1] is set in the straight paper exit path [3].
- The original [5] is detected by the reverse sensor (PS305) [2] and the paper exit senor (PS306) [4].



[1] Paper exit gate (ON)
[2] Reverse sensor (PS305)
[3] Paper exit conveyance path
[4] Paper exit sensor (PS306)
[5] Original

(2) Control

1. When the paper exit solenoid (SD301) is turned on [2] after the scanning [1] is completed, the paper exit gate is set in the straight paper exit path.
2. The reverse/paper exit motor (M303) is turned on at the same time as the conveyance motor (M302), and the original conveyed by the conveyance belt is conveyed to the paper exit roller of the reverse/paper exit section.
3. After the specified time has elapsed from when the reverse sensor (PS305) is turned off, M303 slows down [4] to make the original aligned when it is ejected and the original is ejected to the paper exit stacker at low speed.
4. After the specified time has elapsed from when the paper exit sensor (PS307) is turned off, M303 is turned off [5].



[1] Scanning

[2] Sets the paper exit gate in the straight paper exit path

[3] M302 and M303 starts operating for paper exit

[4] Switching at low speed (M303)

[5] Paper exiting completed

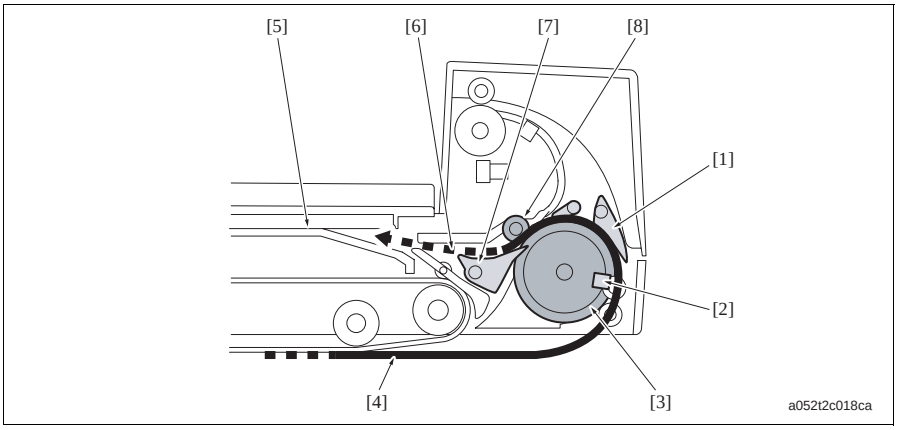
B. Reverse/paper exit

(1) Operation

- The paper exit solenoid (SD301) and the reverse solenoid (SD302) are off in this mode.

1. The original [4] from the conveyance section is fed around the reverse roller [3] through the paper exit gate [1], and conveyed to the reverse stacker [5] by the reverse gate [7].

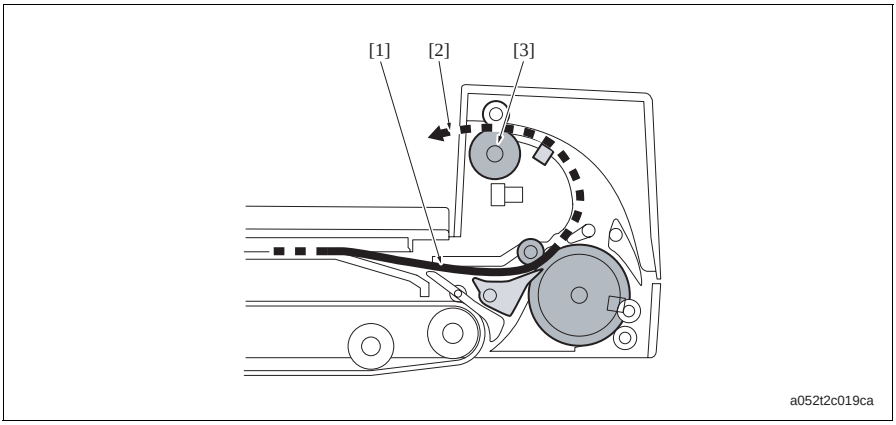
2. The original stops proceeding with its rear end nipped by the reverse roller [8].



[1] Paper exit gate (OFF)
[2] Reverse sensor (PS305)
[3] Reverse roller
[4] Original
[5] Reverse stacker
[6] Conveyance direction
[7] Reverse gate (OFF)
[8] Nipping rear end of the original

3. The reverse roller stops rotating once, then starts reverse rotating and feed the original to the reverse paper exit conveyance path.

4. The paper exit roller slows down when feeding the rear end of the original, and ejects the original with no skew.



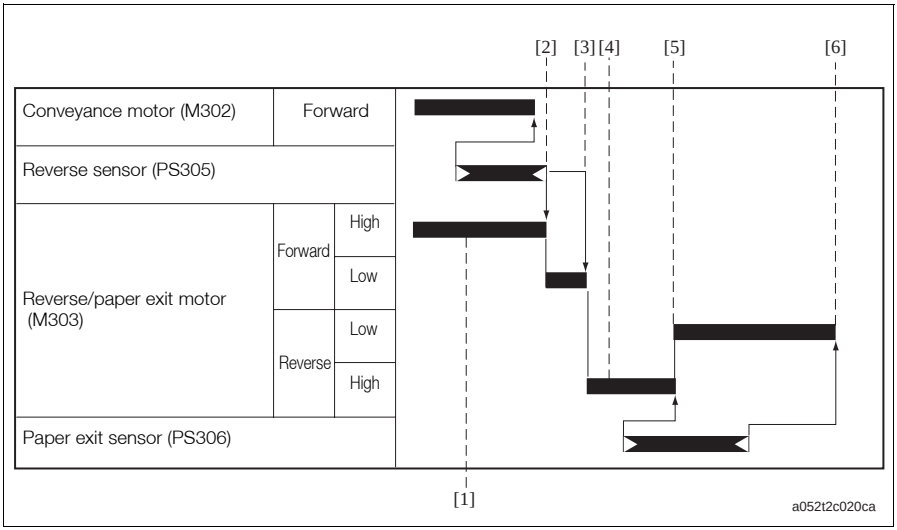
[1] Original

[2] Reverse/paper exit

[3] Paper exit roller

(2) Control

1. The original from the conveyance section is conveyed to the path of the reverse stacker [1] that is set by paper exit gate and the reverse gate.
2. When the reverse sensor (PS305) detects the rear end of the original [2] and turns off, M303 reduces its speed.
3. After the specified time, the original stops proceeding [3] with its rear end nipped by the reverse roller.
4. M303 rotates in reverse and the original is conveyed to the reverse paper exit path [4].
5. After the specified time has elapsed from when the paper exit sensor (PS306) has turned ON, M303 slows down [5] and the original is ejected in reverse at low speed to the paper exit stacker.
6. After the specified time from when PS306 has turned off, M303 is turned off [6].



[1] Conveyance to the reverse stacker

[2] Slowing down (M303)

[3] Stops with rear end nipped

[4] Reverse paper exit (with reverse rotation at high speed)

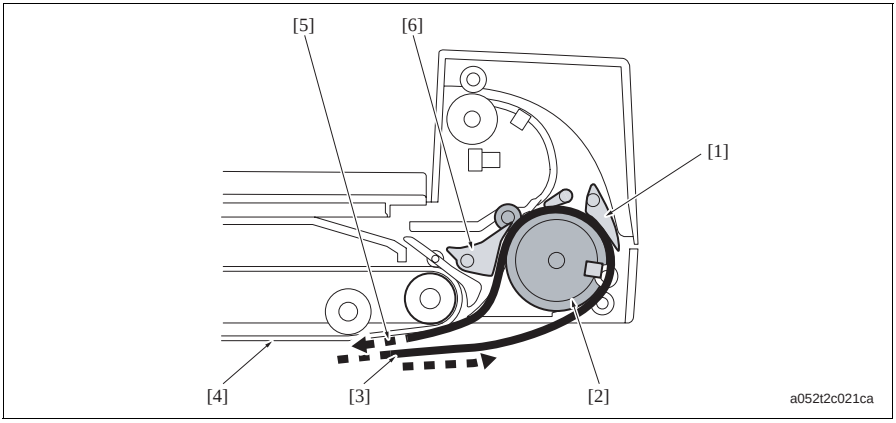
[5] Slowing down to align original

[6] Reverse paper exit completed

6.3.2 Reverse paper exit control

(1) Operation

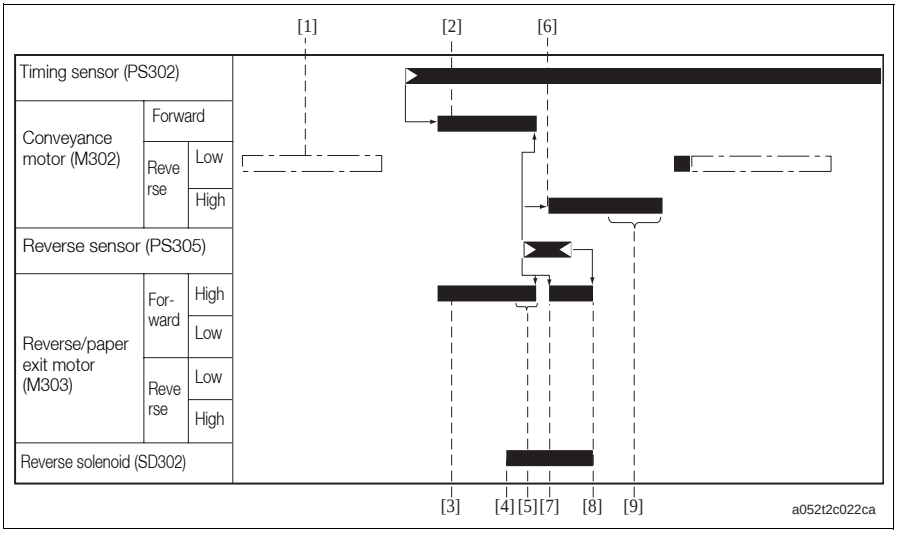
- In reverse conveyance mode, the paper exit solenoid (SD301) is set to OFF while the reverse solenoid (SD302) is set to ON.
- The original [3] from the conveyance section wraps around the reverse roller [2] by the paper exit gate [1]. Then through the reverse gate that is turned ON [6], the original slides under [5] the conveyance belt [4] and is returned to the conveyance section.



[1] Paper exit gate (OFF)
[2] Reverse roller
[3] Original
[4] Conveyance belt
[5] Sliding under the conveyance belt
[6] Reverse gate (ON)

(2) Control

1. After the front side scan is performed [1], the conveyance motor (M302) [2] conveys the original from the conveyance section, and then the reverse/paper exit motor (M303) conveys it to the reverse path that is set the paper exit solenoid (SD301) OFF and the original is fed around the reverse roller [3].
2. When the reverse solenoid (SD302) is turned on [4], the reverse gate sets the conveyance direction toward the conveyance belt. Then the original starts returning [5] to the conveyance section while sliding under the conveyance belt.
3. After the specified time from when the reverse sensor (PS305) has turned ON, M302 and M303 stop rotating once at the same moment. Then M302 switches to rotate in reverse [6] while M303 rotates forward [7] and the original is returned further toward the scanning position.
4. After the specified time from PS305 has turned OFF, M303 [8] turns off. However, the belt keeps conveying. [9]



[1] Front side scanning

[2] Conveyance to the reverse paper exit section (M302)

[3] Conveyance to the reverse paper exit section (M303)

[4] Reverse gate setting

[5] Sliding under the conveyance belt

[6] Reverse conveyance of the belt

[7] Conveyance toward the reverse conveyance

[8] Conveyance completed (M303)

[9] Reverse conveyance by the conveyance belt

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

PF-601/HT-504

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

2006/09	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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PF-601/HT-504

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

1.1 PF-601

A. Type

Type	Front loading type two-tray paper feeder

B. Functions

Number of trays	Two trays (All trays universal)
Tray capacity	6,000 sheets (80 g/m^2 standard paper) = 3,000 sheets x 2 trays

C. Paper type

Paper size	SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5, B5S, A5*1, B6S, A6S*1 13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS Tab paper (A4, 8½ x 11) Custom paper (Max. 330 x 487mm, Min. 100 x 148 mm)	
Applicable paper	Plain paper, high quality paper, coated paper	
Paper weight	Tray/4	64 to 256g/m^2
	Tray/5	64 to 300g/m^2

*1 A5 and A6S are fed only from the tray/5.

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	24/12/5VDC, 200 to 240VAC (supplied both from the main body)
Maximum power consumption	DC: 90W or less, AC: 100W or less
Dimensions	947 (W) x 750 (D) x 1045 (H) mm
Weight	Approx. 170kg

F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80%RH (with no condensation)

1.2 HT-504

A. Type

Type	Fan heater type dehumidifier heater

B. Maintenance

Machine service life	Same as the main body.

C. Machine data

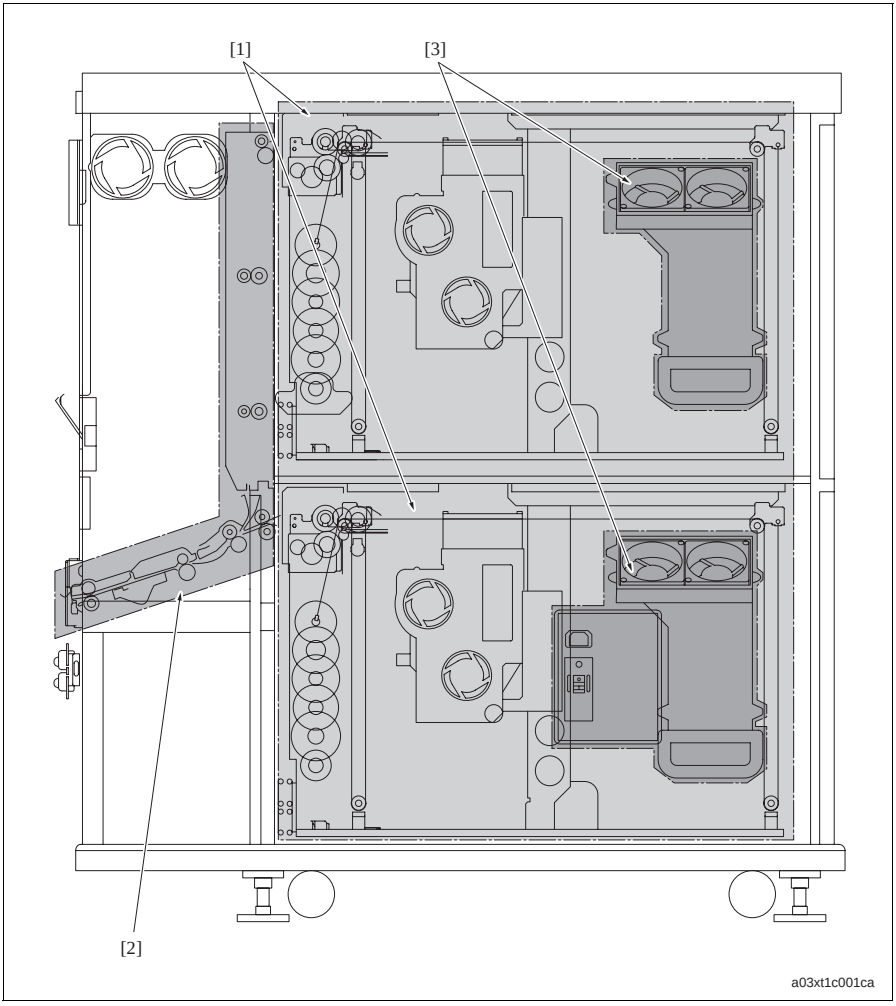
Power source	24/5VDC (supplied from the main body), 200 to 240VAC*1
Maximum power consumption	DC: 6W or less, AC: 580W or less
Dimensions	Dehumidifier fan heater unit: 197 (W) x 82 (D) x 293 (H) mm Power supply unit: 121 (W) x 80 (D) x 160 (H) mm
Weight	Dehumidifier fan heater unit: Approx. 1.5kg/1 unit Power supply unit: Approx. 0.9kg

*1 North America model: Supplied from the main body.
Europe model: Supplied from external.

D. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80%RH (with no condensation)

2. UNIT CONFIGURATION DIAGRAM

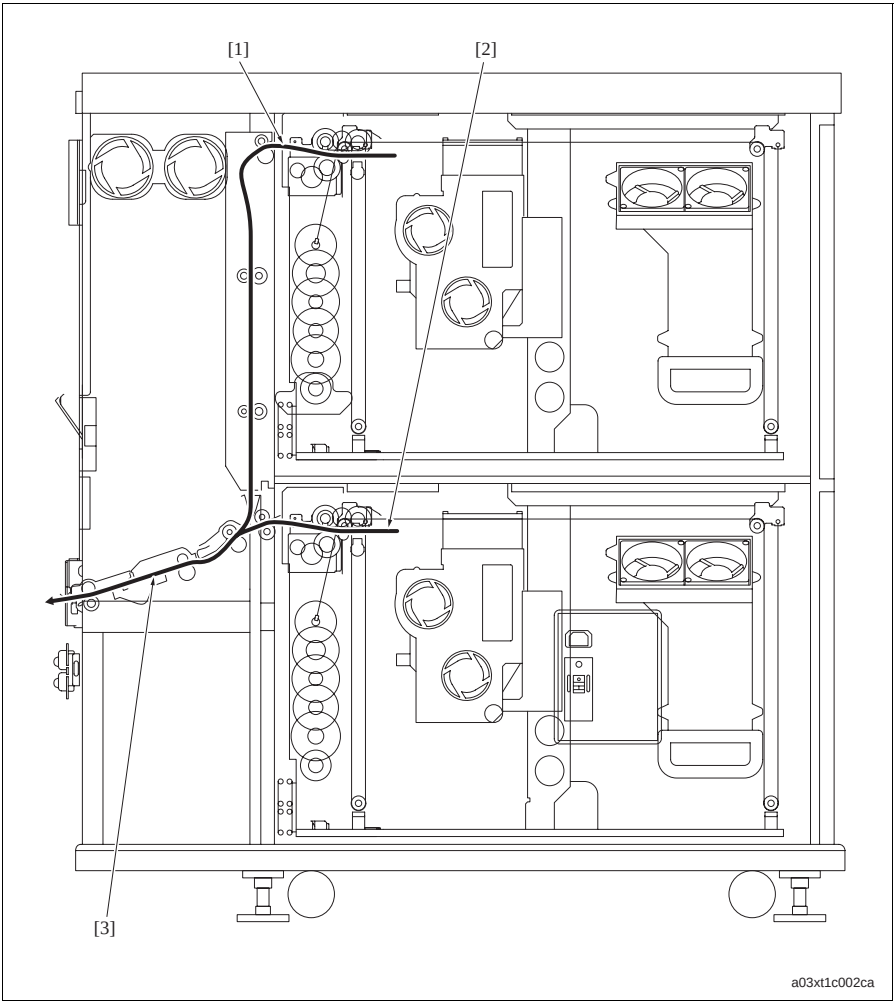


[1] Paper feed section

[2] Conveyance section

[3] HT-504 (Optional)

3. PAPER PATH



[1] From tray/4

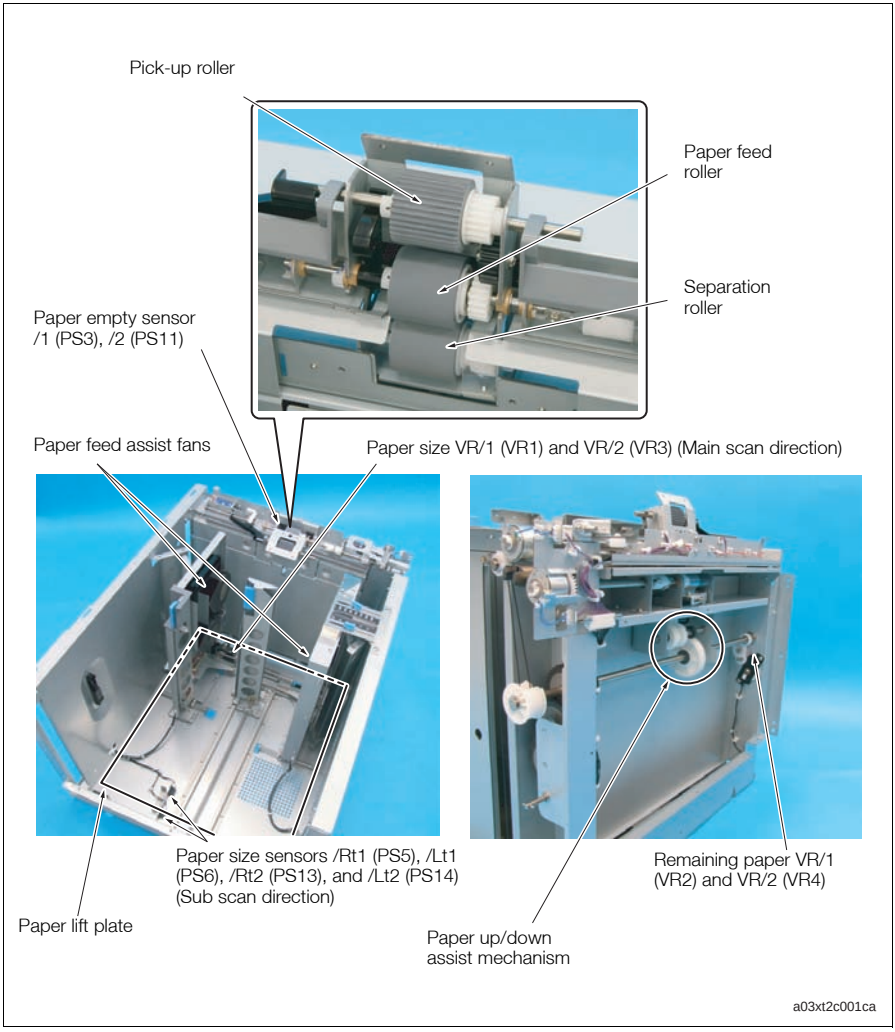
[2] From tray/5

[3] From tray/4 and /5 to the main body

■ CONFIGURATION/OPERATION

4. PAPER FEED SECTION

4.1 Configuration


Pick-up roller
Paper feed roller
Separation roller
Paper empty sensor /1 (PS3), /2 (PS11)
Paper feed assist fans
Paper size VR/1 (VR1) and VR/2 (VR3) (Main scan direction)
Paper size sensors /Rt1 (PS5), /Lt1 (PS6), /Rt2 (PS13), and /Lt2 (PS14) (Sub scan direction)
Paper lift plate
Paper up/down assist mechanism
Remaining paper VR/1 (VR2) and VR/2 (VR4)
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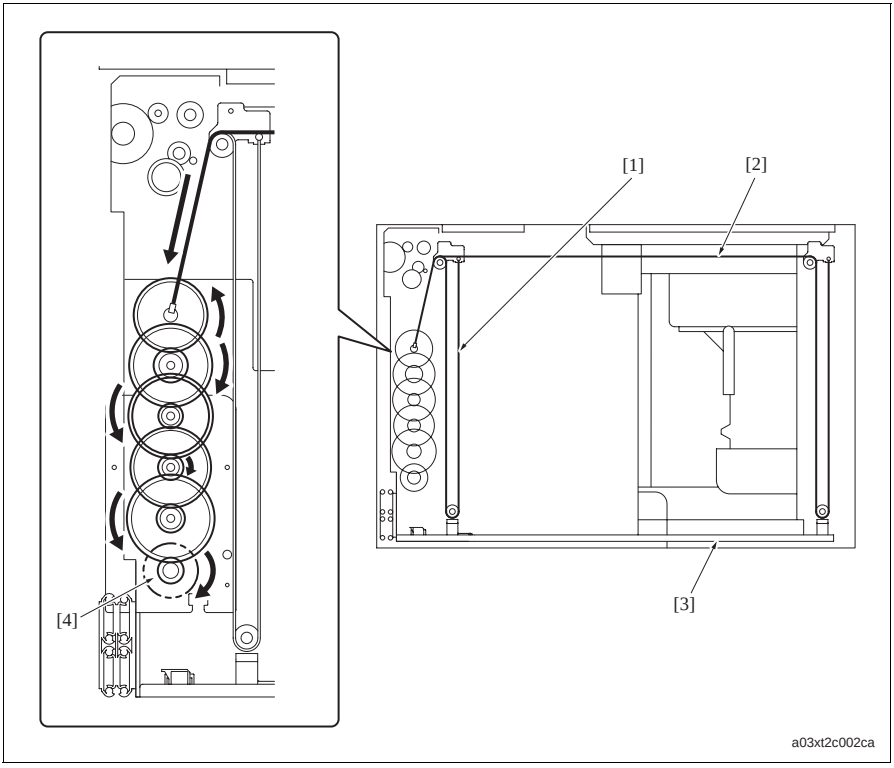
4.2 Drive

4.2.1 Tray lift drive



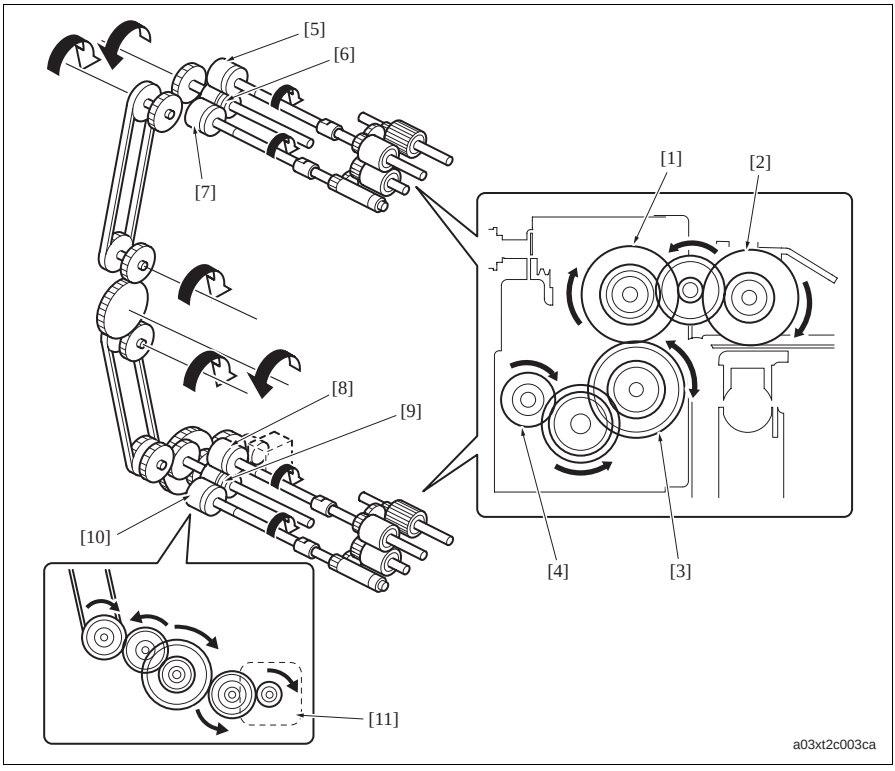
[1] Lift wire/Fr2 and /Rr2

[2] Lift wire/Fr1 and /Rr1

[3] Paper lift plate

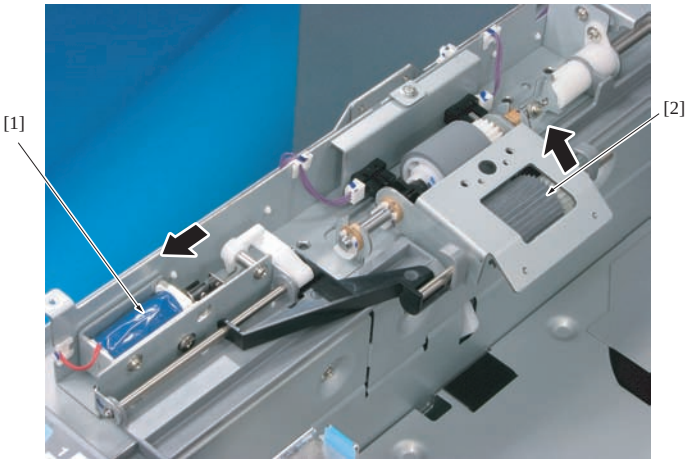
[4] Paper lift motor/1 (M2) and /2 (M3)

4.2.2 Paper feed drive



[1] Paper feed roller
[2] Pick-up roller
[3] Separation roller
[4] Torque limiter
[5] Paper feed clutch/1 (MC1)
[6] Coupling (transmission of driving force to the tray/4)
[7] Separation clutch /1 (MC2)
[8] Paper feed clutch /2 (MC4)
[9] Coupling (transmission of driving force to the tray/5)
[10] Separation clutch /2 (MC5)
[11] Paper feed motor (M1)

4.2.3 Pick-up drive



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[1] Pick-up solenoid/1 (SD1) and /2 (SD5)

[2] Pick-up roller

4.3 Operation

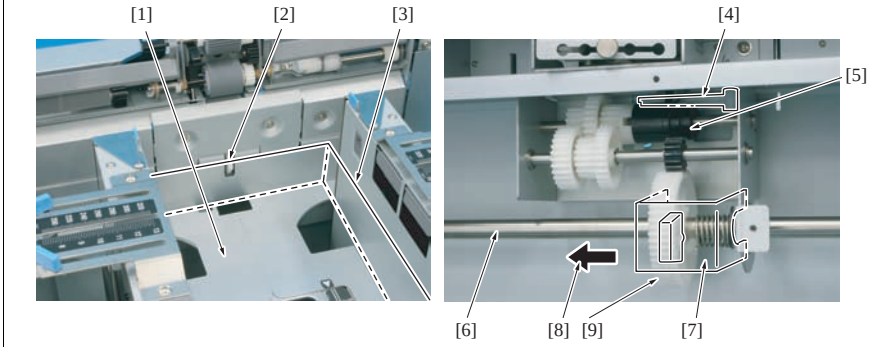
4.3.1 Plate up/down control

A. Plate-up mechanism

- The paper lift motors/1 (M2) and /2 (M3) drive the pulley to wind up the lift wires in order to lift the paper lift plate.

B. Plate-down mechanism

- The paper lift plate [1] goes down by the down button [2].
- Loading papers on the paper lift plate presses the plate-down button [2] on the side of the tray, and release lever [4] releases the coupling in the torque limiter [5]. The pulley drive shaft [6] keeps rotating while the plate-down button is pressed.
- When the paper lift plate [1] is at its uppermost position, the tray-down stopper [7] is on the rear side [8] of the tray, and the gear [9] prevents the paper lift plate from going down.



[1] Paper lift plate
[2] Down button
[3] Papers
[4] Release lever
[5] Torque limiter
[6] Shaft
[7] Tray-down stopper
[8] Rear side of the tray
[9] Gear

C. Operation timing

(1) When tray is set

- The paper lift motors/1 (M2) and /2 (M3) are activated and lift the paper lift plate.
- The M2 and M3 motors are stopped when the upper limit sensors/1 (PS1) and /2 (PS9) detect the uppermost status of the paper lift plate.

(2) During printing

- When the PS1 and PS9 sensors turn off, the M2 and M3 motors are activated.
- When the PS1 and PS9 sensors turn on upon detection of the upper most status of the paper lift plate (with the paper lift plate up), M2 and M3 are stopped.

4.3.2 Paper size detection control

A. Main scan/Sub scan direction detection

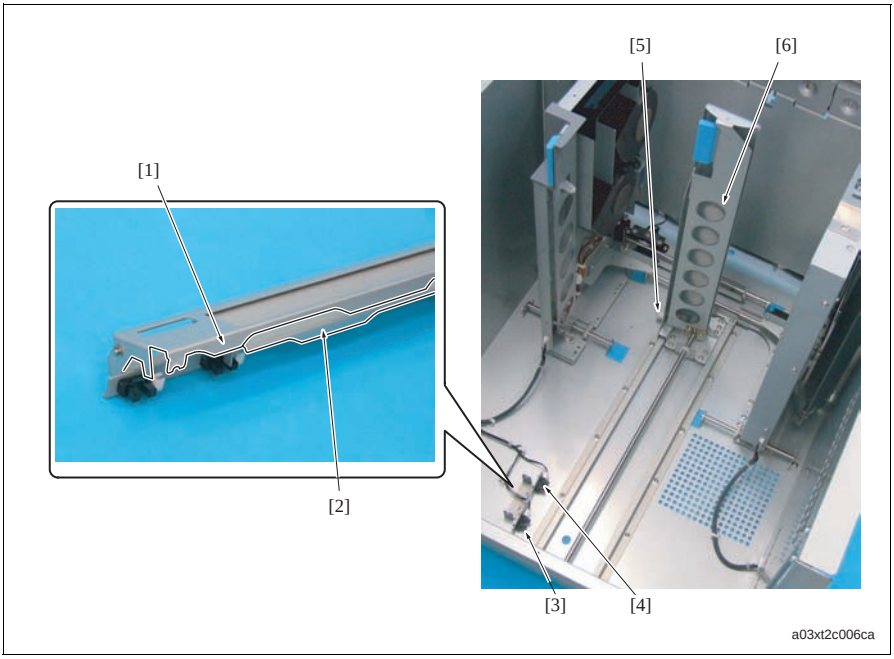
- The detection methods differ between main scanning direction and sub-scanning direction.

(1) Main scan direction

- The size in the main scan direction is detected by the paper size VR/1 (VR1) and /2 (VR3) that move together with the paper guide. The detected size is sent to the main body within a fixed time period after the tray is set.

(2) Sub scan direction

- The size detection in the sub scan direction is made by the following each pair of the sensors: the paper size sensors/Rt1 (PS5) [3] and /Lt1 (PS6) [4] for tray /4, /Rt2 (PS13) [3] and /Lt2 (PS14) [4] for tray /5.
- When the paper rear guide [6] is moved, the detection cams /Up [1] and /Lw [2] that are different in shape are pressed by the knob [5]. Depends on the position of the paper rear guide, the paper size sensors/Rt1 [4], /Rt2 [4] and /Lt1 [3], /Lt2 [3] are turned on and off.



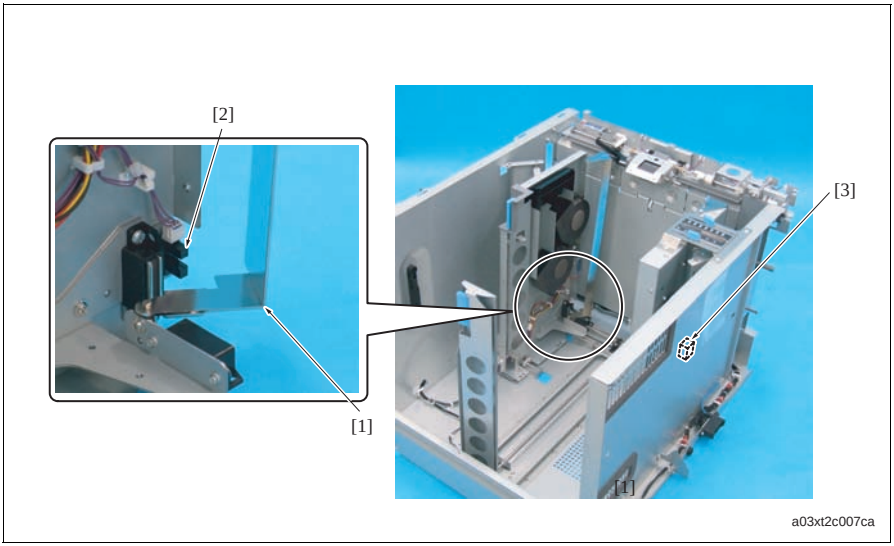
[1] Detection cam/Up
[2] Detection cam/Lw
[3] Paper size sensors/Rt1 (PS5) and /Rt2 (PS13)
[4] Paper size sensors/Lt1 (PS6) and /Lt2 (PS14)
[5] Knob
[6] Paper rear guide

Paper size	Paper size sensor	
	/Lt1 (PS5) and /Lt2 (PS14)	/Rt1 (PS5) and /Rt2 (PS13)
A6S, B6S, A4S, B5, A3, 11 x 17, 13 x 19	OFF (light blocking)	OFF
8½ x 11S, 8K, 16KS	OFF	ON
A5S, B5S, A4, SRA4, B4, 5½ x 8½S, 8½ x 11, 8½ x 14	ON (exposure)	ON
A5, SRA4S, SRA3, 8¼ x 13, 8⅛ x 13¼, 8½ x 13, 8 x 13, 12 x 18, 16K	ON	OFF

* For the paper sizes below, it is necessary to set the paper size on the touch panel.
Make a selection among “SRA4, A5S”, “8x13”, “8⅛ x 13¼”, “8¼ x 13” and “8½ x 13”
Make a selection among “A5” and “5½ x 8½S”
Make a selection among “B4, B5S, B5, 11x17, 8½ x 11” and “8K, 16KS, 16K”

B. Assist guide detection control

- The paper size sensors /Fr1 (PS7), /Fr2 (PS15) [2], /Rr1 (PS8), and /Rr2 (PS16) [3] detect opening or closing of the auxiliary guide [1] when A6S size paper are set.
- When the auxiliary guide [1] is in use, PS15 and PS16 are turned off.
- Tray/4 does not support A6S paper.



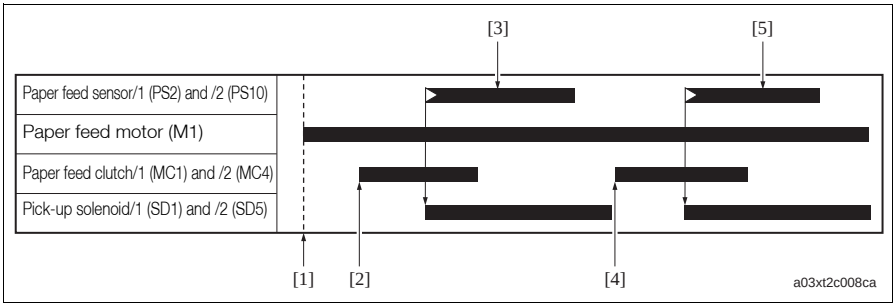
[1] Auxiliary paper guide

[2] Paper size sensors /Fr1 (PS7), and /Fr2 (PS15)

[3] Paper size sensors /Rr1 (PS8), and /Rr2 (PS16)

4.3.3 Pick-up mechanism

- Paper is picked up when the pick-up solenoids/1 (SD1) and /2 (SD5) are turned off.
- When the solenoids SD1and SD5 are turned off, the pick-up roller goes down to press paper by its own weight.
- When the paper feed clutches /1 (MC1) and /2 (MC4) turn on, the pick-up roller starts to rotate and feed paper to the paper feed roller.



[1] START button ON

[2] Pick-up of the 1st sheet of paper

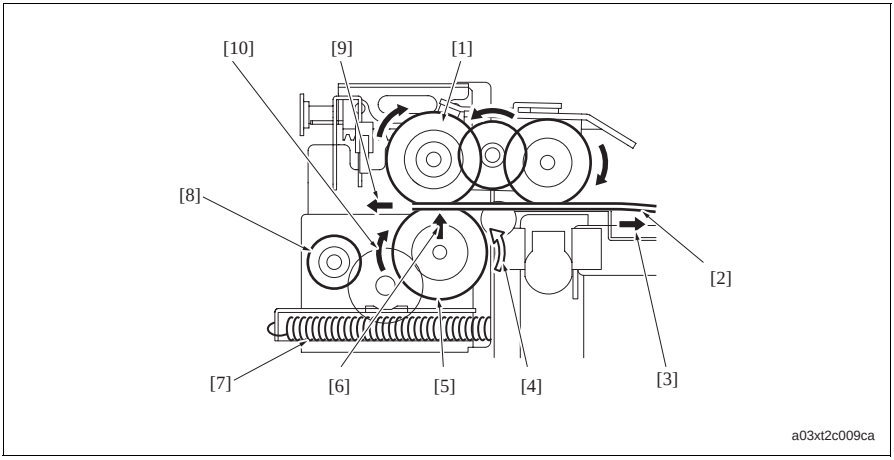
[3] Conveyance of the 1st sheet of paper

[4] Pick-up of the 2nd sheet of paper

[5] Conveyance of the 2nd sheet of paper

4.3.4 Separation mechanism

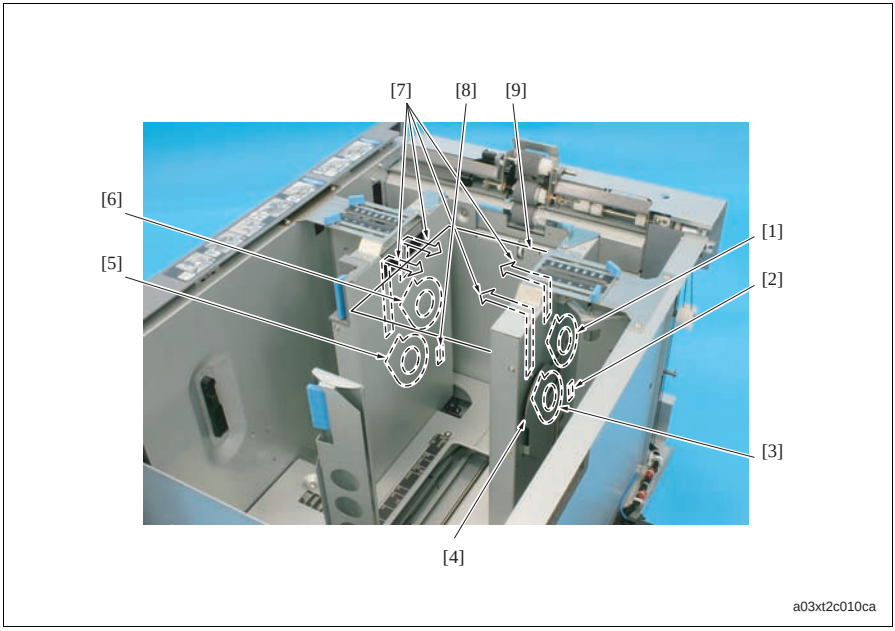
- Papers are separated by the separation roller [5].
- The separation roller [5] rotates in the direction [10] opposite to the paper conveyance direction [9] by means of the torque limiter [8]. The roller is pressed against the paper feed roller by force exerted by the spring [7] and the torque limiter.
- The friction force between the separation roller and the paper feed roller is limited by the torque limiter in order to prevent multi-feed.
- When no paper exists between the separation roller and the paper feed roller or when the only one sheet of paper is present, the separation roller is driven by the paper feed roller in the direction of arrow [4] since the torque is over the limit.
- When multiple sheets of paper are fed, the separation roller reverses the direction of rotation [10] (opposite to the paper feed roller) and feeds the lower paper [2] that contacts with the separation roller back to the tray [3]. The drop in frictional force between the two rollers due to the multiple sheets causes the counter rotating of the separation roller.



[1] Paper feed roller
[2] Lower (2nd) sheet of paper
[3] To the tray
[4] Direction to feed paper normally
[5] Separation roller
[6] Pressing force
[7] Spring
[8] Torque limiter
[9] Paper feed direction
[10] Direction to separate sheets

4.3.5 Air assist mechanism

- The paper feed assist fans that are provided on the paper guides in the trays/4 and /5 blow air [7] onto paper [9] in order to assist the separation of paper.
- Tray/4 is provided with paper feed assist fans/Fr11 (FM1) [6], /Fr12 (FM3) [5], /Rr11 (FM2) [1] and /Rr12 (FM4) [3]. Tray /5 is provided with paper feed assist fans/Fr21 (FM5) [6], /Fr22 (FM7) [5], /Rr21 (FM6) [1], / Rr22 (FM8) [3].
- When feeding from the tray specified as a tray for coated paper, the assist fans of the tray start to operate.



[1] Paper feed assist fans /Rr11 (FM2) and / Rr21 (FM6)

[2] Shutter solenoids /Rr1 (SD3) and / Rr2 (SD7)

[3] Paper feed assist fans /Rr12 (FM4) and / Rr22 (FM8)

[4] Shutter

[5] Paper feed assist fans /Fr12 (FM3) and / Fr22 (FM7)

[6] Paper feed assist fans /Fr11(FM1) and /Fr21 (FM5)

[7] Air-blowing

[8] Shutter solenoids /Fr1 (SD2) and /Fr2 (SD6)

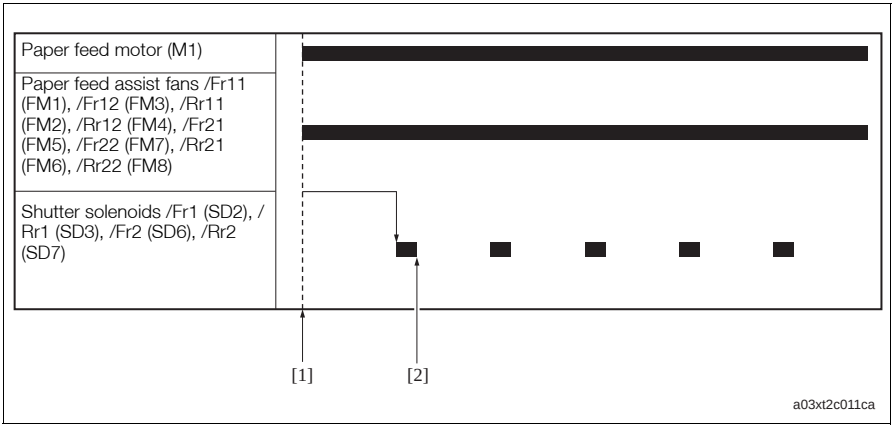
[9] Papers

A. Operation timing

- When the coated paper is selected in the paper setting, the paper feed assist fans/Fr11 (FM1), /Fr12 (FM3), /Rr11 (FM2) and /Rr12 (FM4) or the paper feed assist fans/Fr21 (FM5), /Fr22 (FM7), /Rr21 (FM6) and /Rr22 (FM8) of corresponding tray start to operate when the START button is pressed.

B. Open/close shutter control

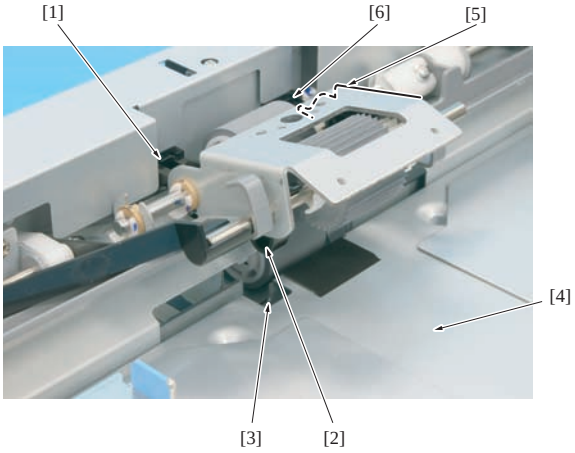
- Amount of air blow is adjusted by the shutter solenoids /Fr1 (SD2) [8], /Rr1 (SD3) [2], /Fr2 (SD6) [8], and /Rr2 (SD7) [2]. When the SD2/ SD3/ SD6/ SD7 turn on, the shutters are closed to increase the air blow.
- The SD2/SD3/SD6/SD7 keep turning off and on for a specified period of time after the start button is turned on.
- Air blow operation is performed once between turning on of the start button and start of paper feed [2].
- The SD2, SD3, SD6 and SD7 can be forced off using DipSW4-0.


Paper feed motor (M1)
Paper feed assist fans /Fr11 (FM1), /Fr12 (FM3), /Rr11 (FM2), /Rr12 (FM4), /Fr21 (FM5), /Fr22 (FM7), /Rr21 (FM6), /Rr22 (FM8)
Shutter solenoids /Fr1 (SD2), /Rr1 (SD3), /Fr2 (SD6), /Rr2 (SD7)
[1]
[2]
a03xt2c011ca

[1] START button ON [2] Start feeding

4.3.6 Paper empty detection control

- Paper empty detection on the tray is made according to on/off statuses of the upper limit sensors/1 (PS1) and /2 (PS9) [6], and the paper empty sensors/1 (PS3) and /2 (PS11) [1].
- When the paper lift plate [4] goes up while paper is on the tray, the paper pushes up the actuator [2] and then the PS3 and PS11 [1] are turned off.When the paper lift plate further goes up, the pick-up roller section [5] is pushed up to turn off the PS1 and PS9 [6].
- When there is no paper, the actuator is inserted in the hole [3] in the paper lift plate and is not lifted up. On the other hand, the pick-up roller section[5] is lifted up to turn off the PS1/ PS9 [6]. If PS1/PS9 turn off when the paper lift plate is being lifted, the product detects that paper is empty and shows the message on the touch panel.
- While feeding paper, the PS3 and PS11 are switched from OFF to ON while the PS1 and the PS9 is OFF, and paper empty is detected.



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[1] Paper empty sensors /1 (PS3) and /2 (PS11)

[2] Actuator of the paper empty sensors /1 (PS3) and /2 (PS11)

[3] Hole

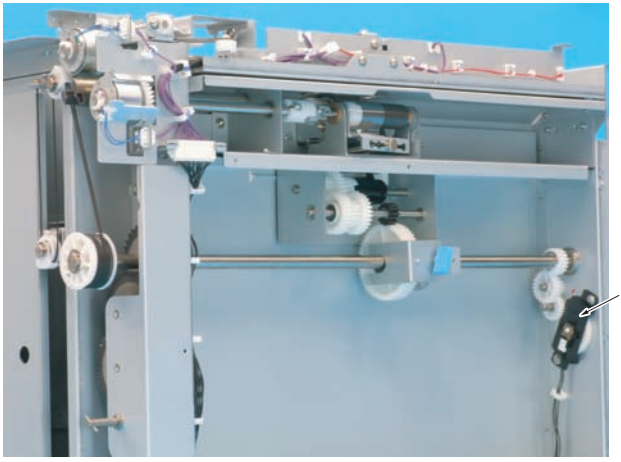
[4] Paper lift plate

[5] Pick-up roller section

[6] Upper limit sensors /1 (PS1) and /2 (PS9)

4.3.7 Remaining paper detection control

- Remaining paper detection is made by the remaining paper VR/1 (VR2) and /2 (VR4) that are interlocked with the up/down operation of the paper lift plate via the pulley and the gear.
- The following 8 levels are detected according to the resistance value, and the detected information is sent to the main body.



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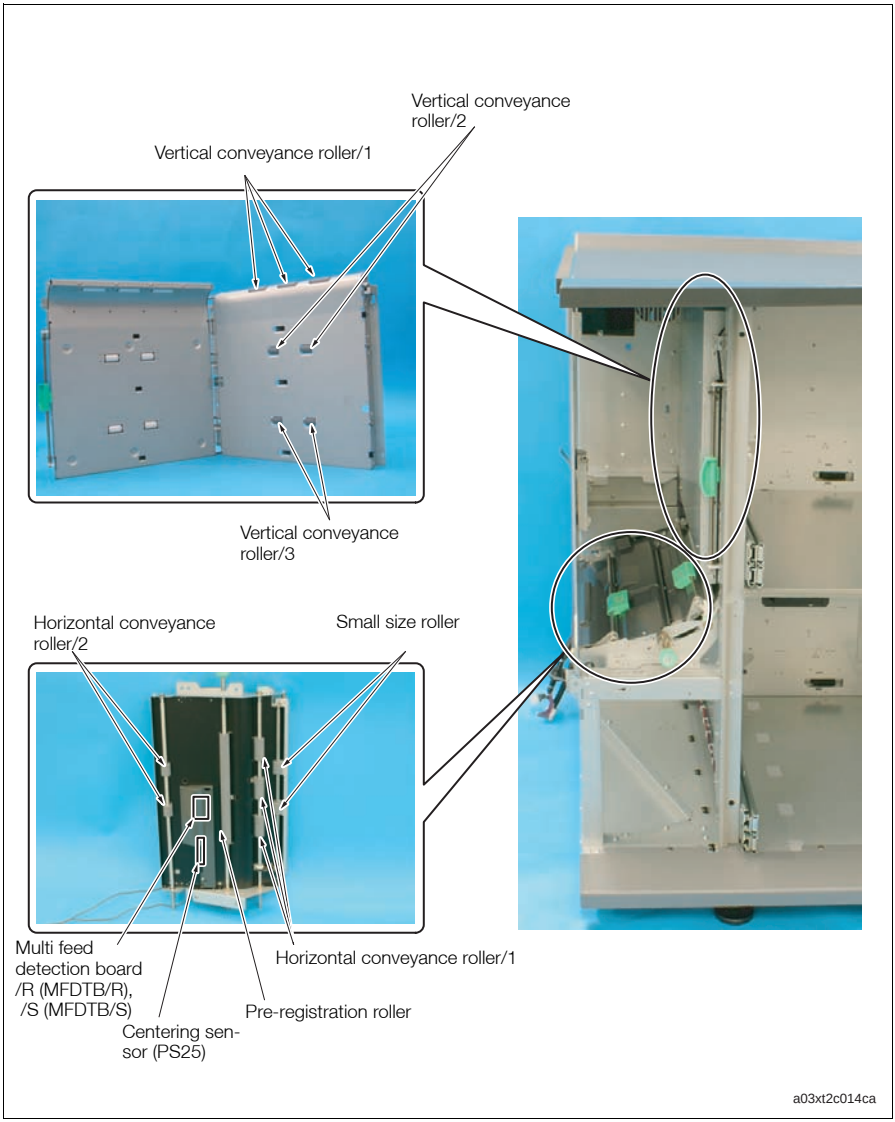
[1] Remaining paper VR/1 (VR2) and VR/2 (VR4)

4.3.8 Tray lock control

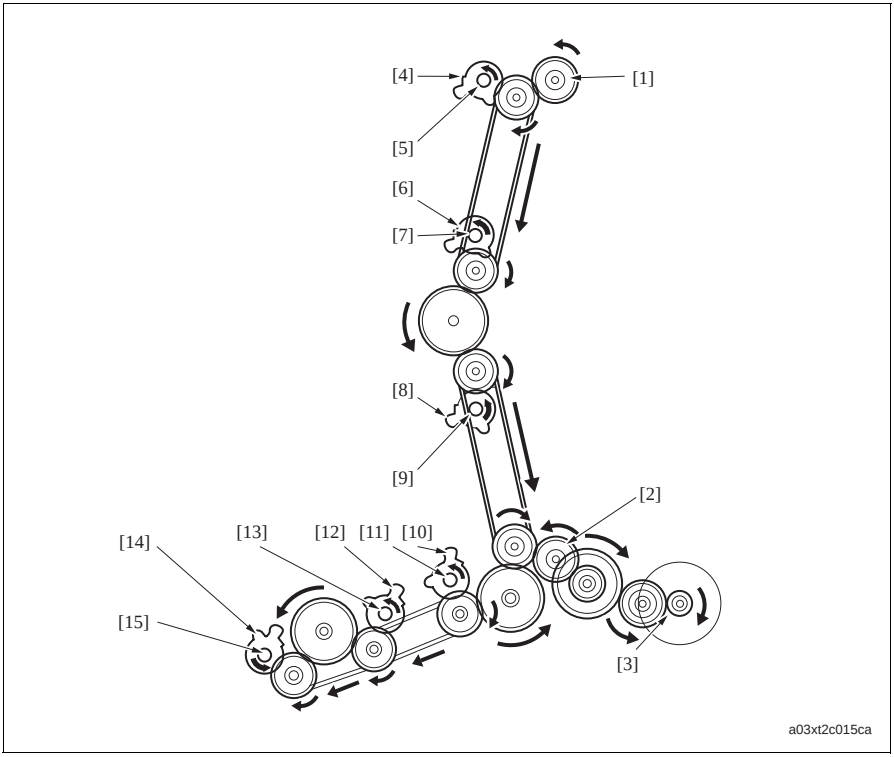
- Each of the tray is locked by the tray locked lever.
- When the tray lock release sensors /1 (PS4) and /2 (PS12) of the either trays /4 or /5 are turned off, the tray lock solenoids /1 (SD4) and /2 (SD8) of the corresponding tray are turned on. This causes the tray lock lever to go up and the tray is unlocked.
- In order to avoid pulling multiple trays out at a time, the SD4 and SD8 solenoids other than those which has already been turned on do not become on even when an off-status of another lock release sensor is detected while PS4 or PS12 sensor is off.
- When a jammed paper is lying over the tray and the exit conveyance section, the tray remains locked until the jammed paper is removed. This prevents the paper from being torn off.

5. CONVEYANCE SECTION

5.1 Configuration



5.2 Drive



[1] Coupling (transmission of driving force to the tray/4)

[2] Coupling (transmission of driving force to the tray/5)

[3] Paper feed motor (M1)

[4] Vertical conveyance clutch/1 (MC7)

[5] Vertical conveyance roller/1

[6] Vertical conveyance clutch/2 (MC8)

[7] Vertical conveyance roller/2

[8] Vertical conveyance clutch/3 (MC9)

[9] Vertical conveyance roller/3

[10] Horizontal conveyance clutch/1 (MC10)

[11] Horizontal conveyance roller/1

[12] Pre-registration clutch (MC12)

[13] Pre-registration roller

[14] Horizontal conveyance clutch/2 (MC11)

[15] Horizontal conveyance roller/2

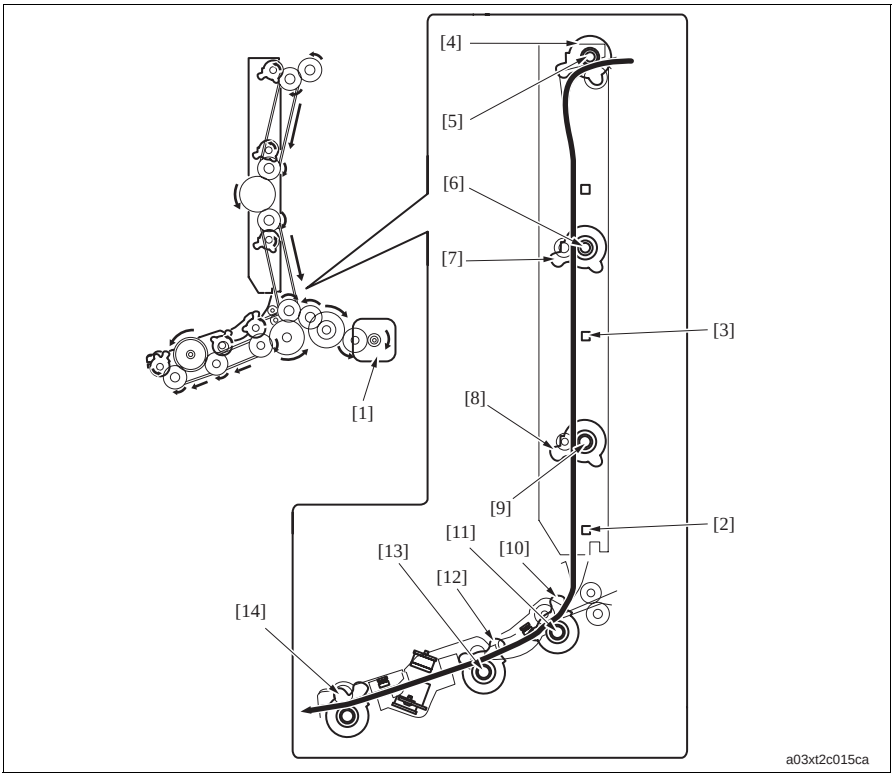
5.3 Operation

5.3.1 Pre-registration control

- In order to correct skew of paper, paper fed from the tray strikes against the pre-registration roller that is stopping at that time.
- The pre-registration clutch (MC12) is turned on, the driving force of the paper feed motor (M1) is transmitted to the pre-registration roller to feed paper inside the main body.

5.3.2 Conveyance control

- For the vertical conveyance, the driving force of the paper feed motor (M1) [1] is transmitted by turning on and off the vertical conveyance clutches /1 (MC7) [4], /2 (MC8) [7], and /3 (MC9) [8].
- For the horizontal conveyance, the driving force of paper feed motor (M1) is transmitted by turning on and off the horizontal conveyance clutches /1 (MC10) [10], /2 (MC11) [14], and the pre-registration clutch (MC12) [12].
- Paper fed from tray/4 is conveyed to the vertical conveyance rollers /1 [5], /2 [6], and /3 [9] driven through MC7, MC8, and MC9, and then conveyed to the horizontal conveyance section.
- Paper fed from tray/4 vertically or fed from tray/5 is conveyed to the pre-registration roller [13] by the horizontal conveyance roller/1 [11] driven via the MC10. Then, the pre-registration control described above is performed and the paper is fed inside the main body.
- When the vertical conveyance sensors /2 (PS27) [3] and /3 (PS26) [2] detect the paper trailing edge, the sensors read it twice within the specified time. The paper trailing edge once passed through the sensors may return to the sensor detection position due to slack in the paper, and detected by the sensors again unexpectedly. To prevent the mis-detection, the sensors carry out the detection operation twice every time.



[1] Paper feed motor (M1)
[2] Vertical conveyance sensor/3 (PS26)
[3] Vertical conveyance sensor/2 (PS27)
[4] Vertical conveyance clutch/1 (MC7)
[5] Vertical conveyance roller/1
[6] Vertical conveyance roller/2
[7] Vertical conveyance clutch/2 (MC8)
[8] Vertical conveyance clutch/3 (MC9)
[9] Vertical conveyance roller/3
[10] Horizontal conveyance clutch/1 (MC10)
[11] Horizontal conveyance roller/1
[12] Pre-registration clutch (MC12)
[13] Pre-registration roller
[14] Horizontal conveyance clutch/2 (MC11)

5.3.3 Multi feed detection control

- The multi feed sensor is provided in the horizontal conveyance section to detect multi feed.
- The multi feed sensor is a ultrasonic sensor consisted of a sending and receiving section. The ultrasonic waves sent from the multi feed detection board/S (MFDTB/S) are received at the multi feed detection board/R (MFDTB/R).
- The intensity of the ultrasonic waves received by the receiving section differs according to the number of sheets passed between the MFDTB/S and MFDTB/R. Therefore, the sensor can detect multi feed by the intensity.
- When multi feed is detected, the paper feeding operation will stop, however, the next sheet of paper is fed as usual.
- The multi feed detection function can be enabled/disabled using DipSW19-4.

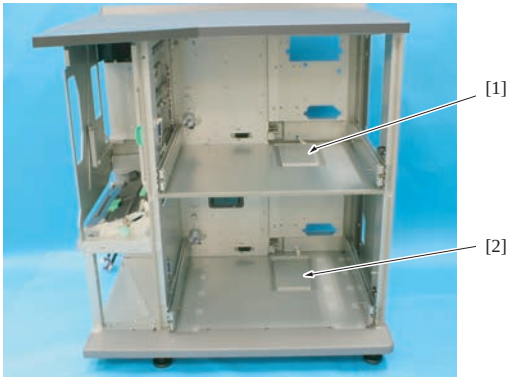
5.3.4 Centering detection control

- While paper being fed, centering sensor (PS25) detects the paper edges in the main scan direction.
- The detected information is written in the image processing section so that a scanned image is precisely located and printed on the paper as intended.
- In order to increase the life of the PS25, the sensor is not always "On"; it turns off after sending the detected information to the main body and turns on when it detects the paper reached to the pre-registration sensor.

6. OTHERS

6.1 Dehumidifier heater control

- Dehumidifier heaters /1 (HTR1) and /2 (HTR2) are provided under the trays /4 and /5, one for each tray, to prevent paper from damping.
- When the sub power switch (SW2) is turned off, the HTR1 and HTR2 are turned on.



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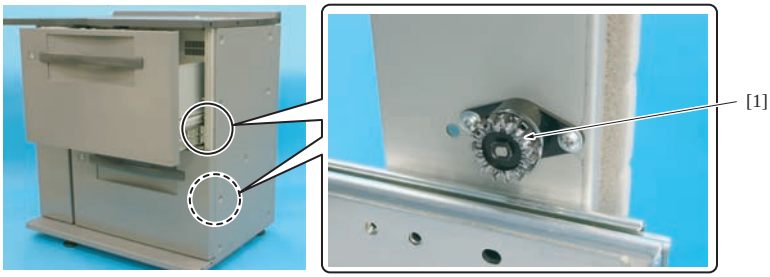
[1] Dehumidifier heater/1 (HTR1)

[2] Dehumidifier heater/2 (HTR2)

6.2 Tray damper mechanism

- The damper [1] is provided in the tray to prevent the pile of paper from becoming misaligned due to the vibration caused when inserting the tray.

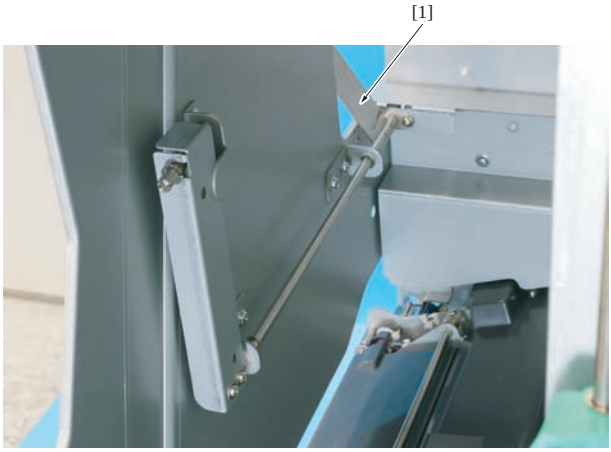


[1] Damper

6.3 Main body assist mechanism

6.3.1 Filter replacement assy retaining mechanism

- When PF is installed to the main body, the filter replacement assy retaining mechanism [1] of PF presses down the filter replacement assy of the main body to prevent the filter replacement assy from coming loose.



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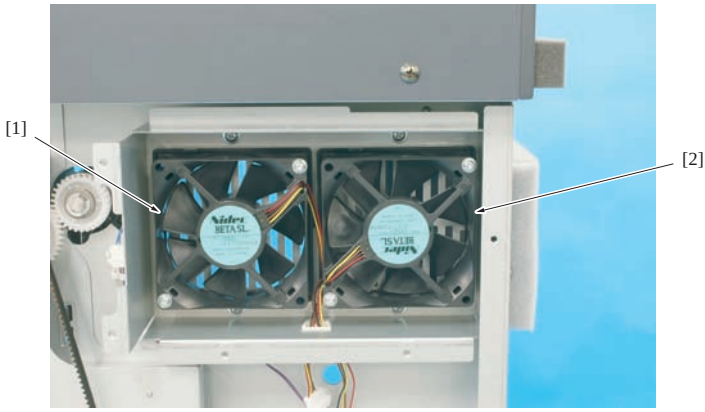
[1] Filter replacement assy retaining mechanism

6.3.2 Filter replacement assy ventilation mechanism

- When PF is installed to the main body, the ventilation fan/1 (FM10) [1] and /2 (FM9) [2] operate to exhaust heated air around the writing section of the main body.
- When the sub power switch (SW2) of the main body is on, FM10 and FM9 keep turned on.



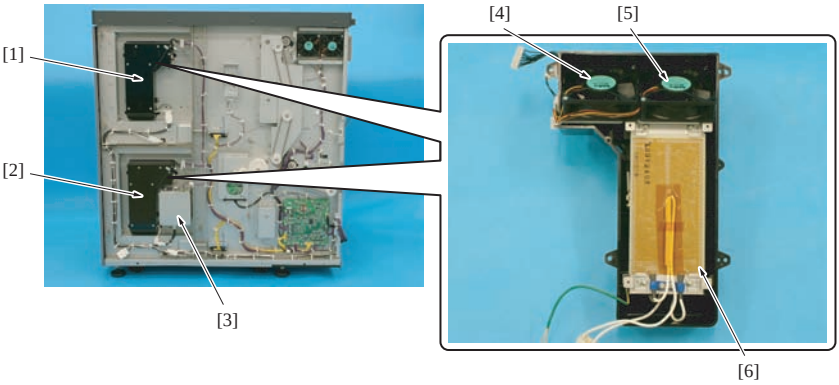
[1] Ventilation fan/1 (FM10) [2] Ventilation fan/2 (FM9)

6.3.3 Environment temperature detection assist mechanism

- When PF is installed to the main body, the temperature-humidity sensor (TEM/HUMS) of PF is used to check the environment temperature and humidity instead of the sensor of the main body since the temperature-humidity sensor/1 (TEM/HUMS/1) on the right side of the main body is disabled.

7. HT-504 (OPTIONAL)

7.1 Configuration



[1] Dehumidifier fan heater unit/Up
[2] Dehumidifier fan heater unit/Lw
[3] Power unit
[4] Dehumidifier fan/1 (FM13) and /3 (FM11)
[5] Dehumidifier fan/2 (FM14) and /4 (FM12)
[6] Fan heater/Up (HTR3) and /Lw (HTR4)

7.2 Operation

7.2.1 Dehumidifier fan heater control

A. Dryness preparation control

- When the Dryness preparation control is set to [On] in the user settings, preliminary drying operation is performed before printing after opening/closing the tray.
- When the dehumidifier fan heater preliminary drying control is set to [Off] in the user settings, preliminary drying operation is performed before printing after opening/closing the tray when the amount of remaining papers are changed. The drying operation is not conducted unless the amount of remaining papers are changed.
- To prevent paper feed jam in the paper feed section, the fan heaters /Up (HTR3), /Lw (HTR4), dehumidifier fans /1 (FM13), /2 (FM14), /3 (FM11), and /4 (FM12) control dehumidification by circulating warm air.
- When the temperature-humidity sensor (TEM/HUMS) of PF detects the environment humidity is more than 56%, HTR3, HTR4, FM11, FM12, FM13 and FM14 are turned on.

B. Dehumidifier control operation start conditions

- When turning the sub power switch (SW2) off with the dehumidifier fan heater setting set to [Automatic] or [On (compulsory)] in the user settings and coated paper is selected.
- When opening/closing the tray with the dehumidifier fan heater setting set to [Automatic] or [On (compulsory)] in the user settings and coated paper is selected.
- When changing the original setting to coated paper from other types with the dehumidifier fan heater setting set to [Automatic] or [On (compulsory)] in the user settings.
- When changing the dehumidifier fan heater setting to [Automatic] or [On (compulsory)] from [Off (compulsory)].

C. Operation details

- Detects the temperature in the trays with the temperature sensors /1 (TEMS/1) and /2 (TEMS/2) and controls the dehumidification until the temperature reaches the target level.
- During the dehumidification, the printing from the tray is prohibited.

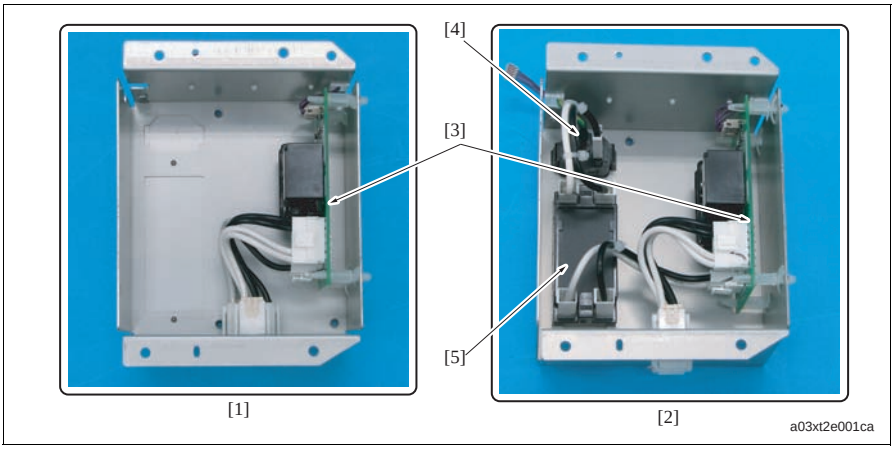
Ambient humidity	Target temperature rise in the tray
Less than 55%	Not controlled
56 to 60%	6°C
61 to 65%	7°C
66 to 70%	8°C
71 to 75%	9°C
More than 76%	10°C

D. Dehumidifier control operation stop conditions

- When a original setting other than the coated paper is selected during dehumidifier control operation.
- When the dehumidifier fan heater setting is changed to [Off (compulsory)] during dehumidifier control operation.

7.2.2 AC power control

- When the temperature sensor in the dehumidifier fan heater unit detects an error, a relay in the AC board [3] is cut off to prevent abnormal temperature from occurring.
- AC voltage is supplied either from the main body [1] or external [2]. Parts whose voltage is supplied from external are equipped with an inlet [4] and a circuit breaker switch [5] in the power supply unit.



[1] The AC voltage supplied from the main body

[2] The AC voltage supplied from external

[3] AC drive board (ACDB)

[4] Inlet

[5] Circuit breaker switch

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

LU-202/HT-503

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

2006/09	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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LU-202/HT-503

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

1.1 LU-202

A. Type

Type	Side mount type large volume paper feed tray

B. Functions

Max. tray capacity	2500 sheets (80 g/m ^{2})*1

*1 Stacked height 275 mm

C. Paper type

Paper size	SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5 13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S 8K, 16K Tab paper (A4, 8½ x 11) Custom paper (Max. 330 x 487mm, Min. 210 x 182 mm)*1
Applicable paper	Plain paper, high quality paper, coated paper 64 to 300 g/m^2 *1

*1 Available types of paper weighing 300 g/m^2 are limited to specific types.

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	24/12/5VDC, 200 to 240VAC (supplied both from the main body)
Maximum power consumption	DC: 40W or less, AC: 50W or less (not including HT-503)
Weight	Approx. 40kg
Dimensions	710 (W) x 639 (D) x 477 (H) mm

F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

1.2 HT-503

A. Type

Type	Fan heater type dehumidifier device

B. Maintenance

Machine service life	Same as the main body.

C. Machine data

Power source	24/5VDC, 200 to 240VAC (supplied both from the main body)
Maximum power consumption	DC: 4W or less, AC: 290W or less
Dimensions	Dehumidifier fan heater unit: 293 (W) x 82 (D) x 197 (H) mm Power unit: 121 (W) x 80 (D) x 160 (H) mm
Weight	Dehumidifier fan heater unit: Approx. 1.5 kg Power supply unit: Approx. 0.9 kg

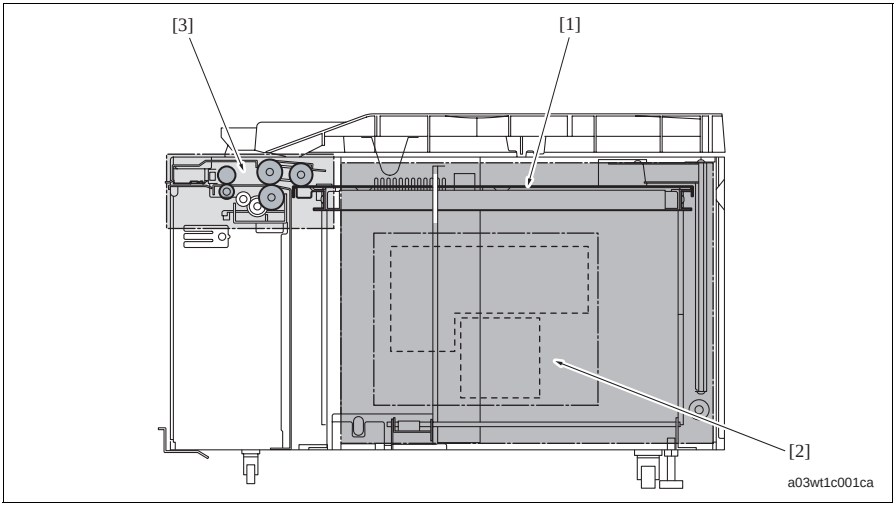
D. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80%RH (with no condensation)

Note

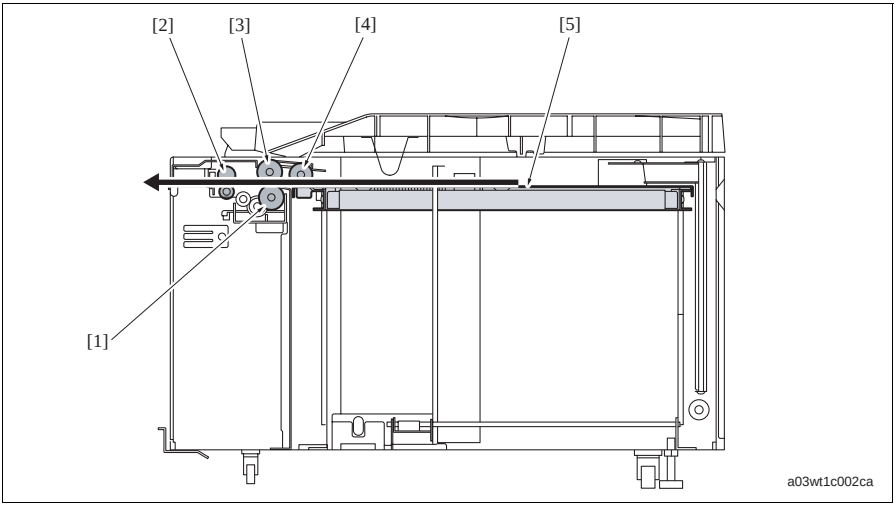
- **The information herein may be subject to change for improvement without notice.**

2. UNIT CONFIGURATION DIAGRAM



[1] Up/down section
[2] HT-503 (Optional)
[3] Paper feed section

3. PAPER PATH

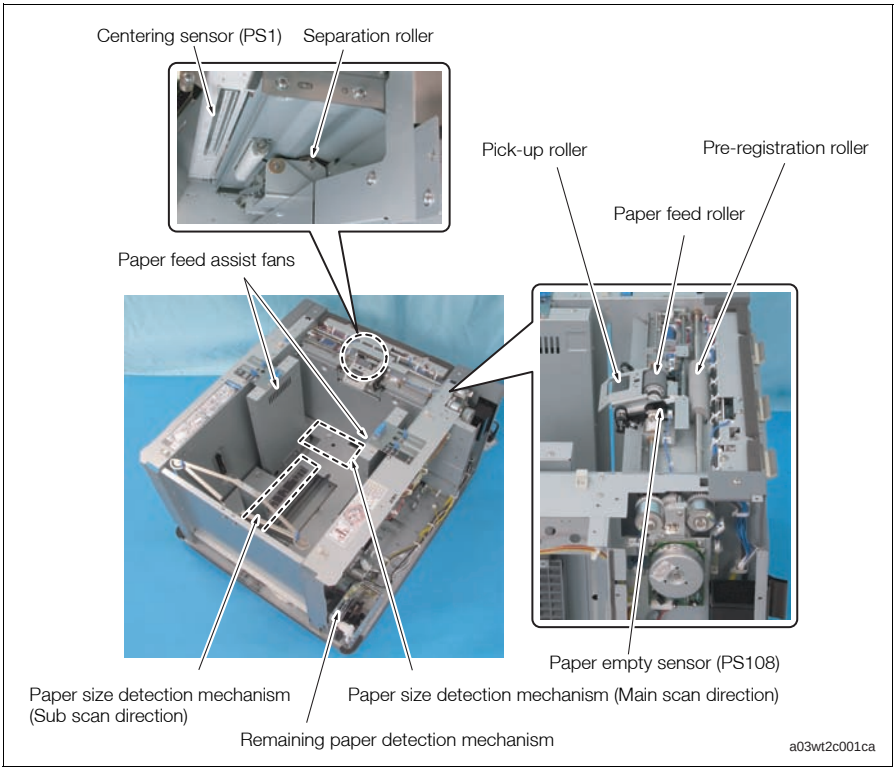


[1] Separation roller
[2] Pre-registration roller
[3] Paper feed roller
[4] Pick-up roller
[5] Paper lift plate

■ CONFIGURATION/OPERATION

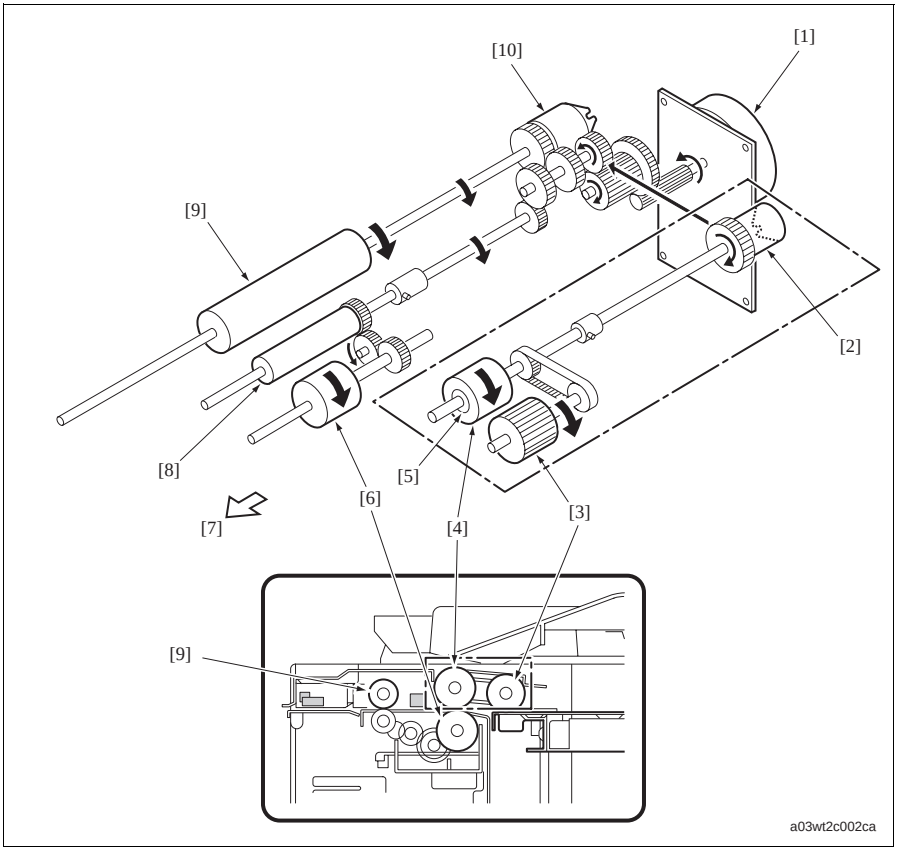
4. PAPER FEED SECTION

4.1 Configuration



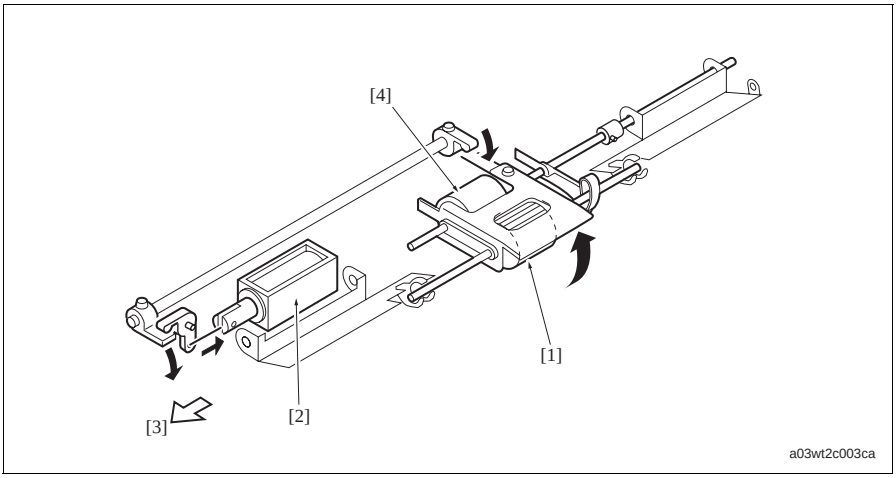
4.2 Drive

4.2.1 Paper feed drive



[1] Paper feed motor (M1)
[2] Paper feed clutch (MC101)
[3] Pick-up roller
[4] Paper feed roller
[5] One-way mechanism
[6] Separation roller
[7] Front side
[8] Torque limitter
[9] Pre-registration roller
[10] Pre-registration clutch (MC102)

4.2.2 Pick-up drive



[1] Pick-up roller
[2] Pick-up solenoid (SD100)
[3] Front side
[4] Paper feed roller

4.3 Operation

4.3.1 Paper feed control

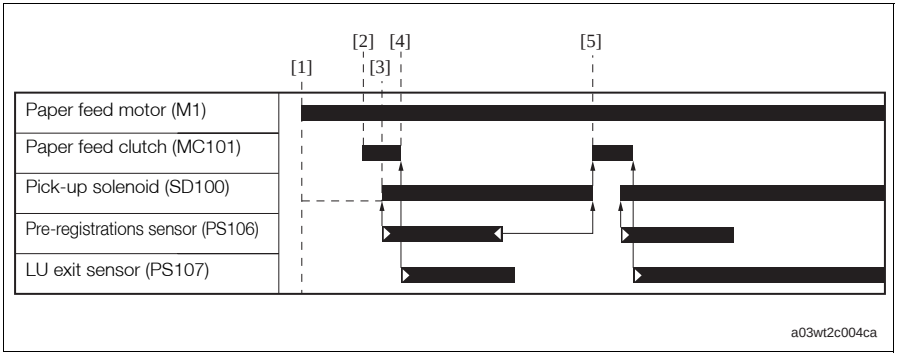
A. Pick-up control

(1) Outline

- Paper is picked up when the pick-up solenoid (SD100) is turned off.
- The pick-up roller rotates with the paper feed roller.

(2) Operation

1. At the time printing is started [1], SD100 is off and the pick-up roller presses against loaded paper with its own weight.
2. Then the paper feed clutch (MC101) turns on [2] to transmit drive force of the paper feed motor (M1) to the pick-up roller, and the pick-up roller starts to rotate and picks up a sheet of paper to be fed by the paper feed roller.
3. When the Pre-registrations sensor (PS106) located just before the pre-registration roller detects the leading edge of the paper [3], SD100 turns on to make the pick-up roller separate from the paper, and the paper is fed only by the paper feed roller.
4. When the LU exit sensor (PS107) turns on [4], MC101 is turned off to stop the paper feed roller and the pick-up roller.
5. When a predetermined time period has elapsed after PS107 detects the first paper and turns off, SD100 turns off to bring the pick-up roller into contact with the loaded paper, and at the same time, MC101 becomes on to make the pick-up roller rotate and pick up the second sheet of paper [5].



[1] START button (ON)

[2] Pick-up roller presses paper with its own weight.

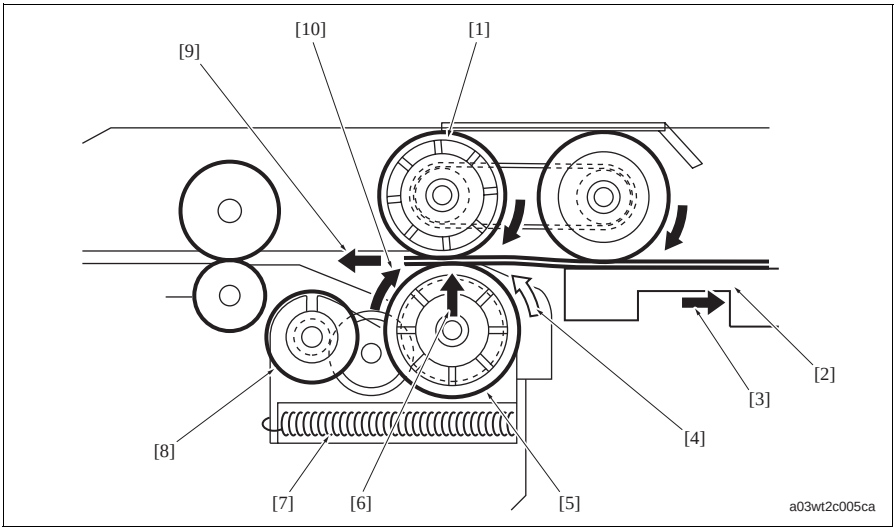
[3] Drive force transmission to the pick-up roller and paper feed roller.

[4] Pick-up roller separates from loaded paper

[5] Pick-up roller goes down

B. Separation mechanism

- The separation roller [5] rotates in the direction [10] opposite to the paper conveyance direction [9] by means of the torque limiter [8].
- The separation roller is pressed against the paper feed roller [1] by the force [6] exerted by the spring [7] and the torque generated by the torque limiter. The friction force between the separation roller and the paper feed roller is limited by the torque limiter in order to prevent multi-feed.
- When no paper exist between the separation roller and the paper feed roller, and when the only one sheet of paper is present, the separation roller is driven by the paper feed roller in the direction of the arrow [4] since the torque is over the limit.
- When multiple sheets of paper are fed, the friction force between the two rollers drops causing counterrotating [10] of the separation roller, and the lower paper [2] that contacts with the separation roller is fed back to the tray [3].

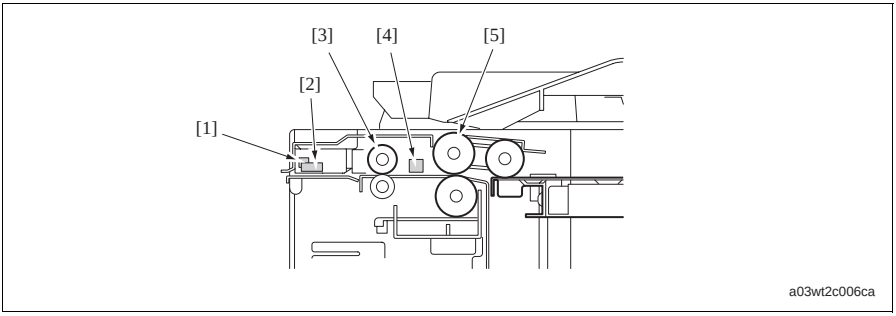


[1]	Paper feed roller	[6]	Spring force
[2]	2nd sheet of paper	[7]	Spring
[3]	To the tray	[8]	Torque limiter
[4]	Driven rotation	[9]	Conveyance direction
[5]	Separation roller	[10]	Rotation of separation direction

C. Pre-registration control

(1) Outline

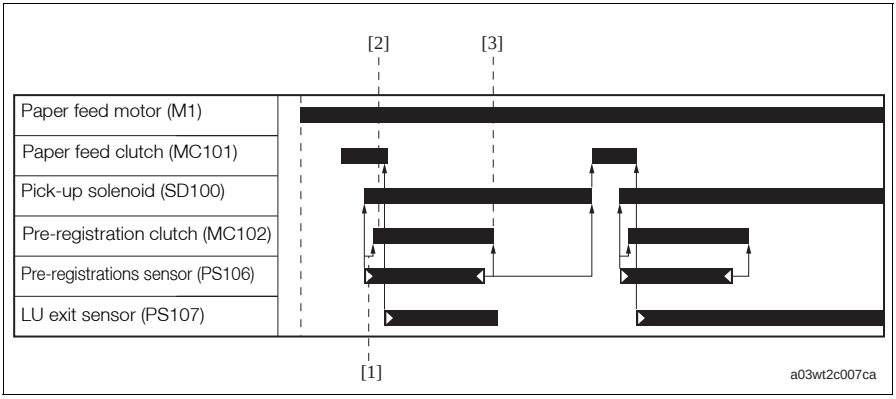
- The pre-registration roller [3] is driven by the paper feed motor (M1) via the pre-registration clutch (MC102). M1 drive force is transmitted/shut off by MC102 to rotate/stop the roller.
- The pre-registration control for the second and subsequent papers differs depending on the paper size (whether the paper is small-sized or large-sized) because of the difference in interval between papers.
- This control is carried out mainly by the pre-registration sensor (PS106) [4], LU exit sensor (PS107) [1], the intermediate conveyance sensor/1 (PS27 in the mainbody), and the intermediate conveyance sensor/2 (PS28 in the mainbody).



[1] LU exit sensor (PS107)
[2] Centering sensor (PS1)
[3] Pre-registration roller
[4] Pre-registrations sensor (PS106)
[5] Paper feed roller

(2) Control for small-sized paper

1. Paper fed by the paper feed roller hits against the pre-registration roller that is stopping due to the off-status [1] of MC102, and the skew of paper is corrected.
2. Then, after a predetermined time period has elapsed, MC102 turns on [2] to rotate the pre-registration roller to convey the paper.
3. When a predetermined time period has elapsed after PS106 detects the rear end of the paper, MC102 turns off to stop the pre-registration roller [3].
4. The same operation is carried out for the second and subsequent papers.



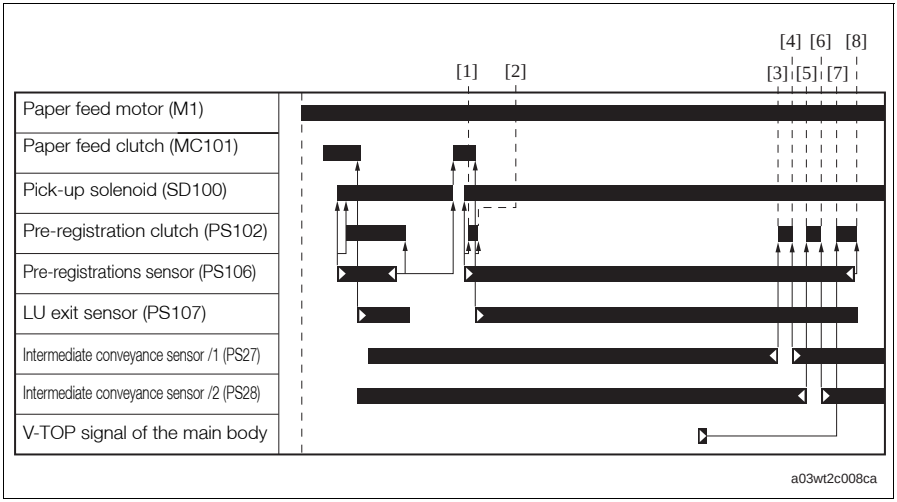
[1] Paper skew correction

[2] Paper conveyance into the main body

[3] MC102 turns off upon completion of 1st paper conveyance

(3) Control for large-sized paper

1. The pre-registration for the 1st sheet of paper is carried out in the same manner as that for small-sized paper.
2. MC102 turns on again [1] after the 2nd paper hits against the pre-registration roller, and turns off [2] when a predetermined time period has elapsed after the LU exit sensor (PS107) detects the leading edge of paper, then keeps the off-status until the rear end of the 1st paper is detected by PS27 in the main body.
3. When PS27 detects the rear end of the 1st paper, the MC102 turns on [3] to convey the 2nd paper, and turns off [4] when the leading edge of the 2nd paper is detected by the PS27.
4. The MC102 turns on again [5] when PS28 detects the rear end of the 1st paper, and turns off [6] when PS28 detects the leading edge of the 2nd paper.
5. When a predetermined time period has elapsed after a V-TOP signal is issued (when a printing process for the 1st paper is finished), MC102 turns on again [7] to convey the 2nd paper, and turns off to stop the conveyance when a predetermined time period has elapsed after PS106 detects the rear end of the paper.



[1] Paper skew correction

[2] Waits until PS27 detects the 1st paper

[3] Starts conveyance of the 2nd paper to PS27

[4] Turns off when the 2nd paper reaches PS27

[5] Starts conveyance of the 2nd paper to PS28

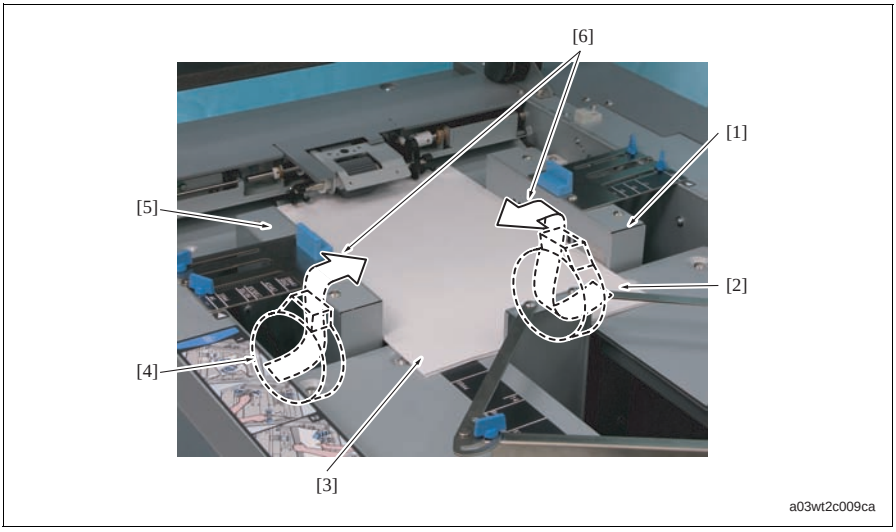
[6] Turns off when the 2nd paper reaches PS28

[7] Restarts conveyance

[8] MC102 turns off upon completion of 2nd paper conveyance

D. Air assist control

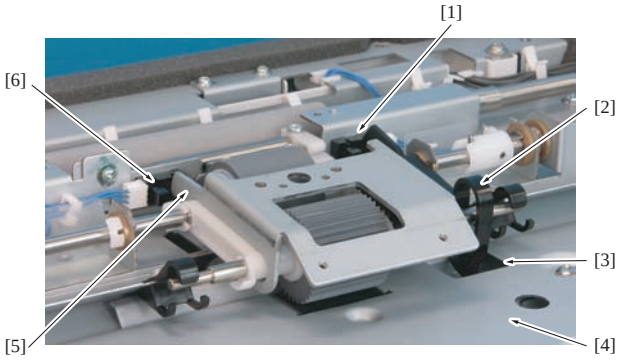
- The paper feed assist fan/Fr (FM1) and /Rr (FM2) are mounted to the side guide/Fr and /Rr respectively in order to assist the separation of paper.
- When coated paper has been selected at the paper setting, FM1 and FM2 turns on upon receiving a print start signal.
- The air-blowing level of the FM1 and FM2 can be selected from Auto, ON (strong), ON (weak), and OFF at the paper setting.



[1] Side guide/Rr
[2] FM2
[3] Paper
[4] FM1
[5] Side guide/Fr
[6] Airflow

4.3.2 Paper empty detection control

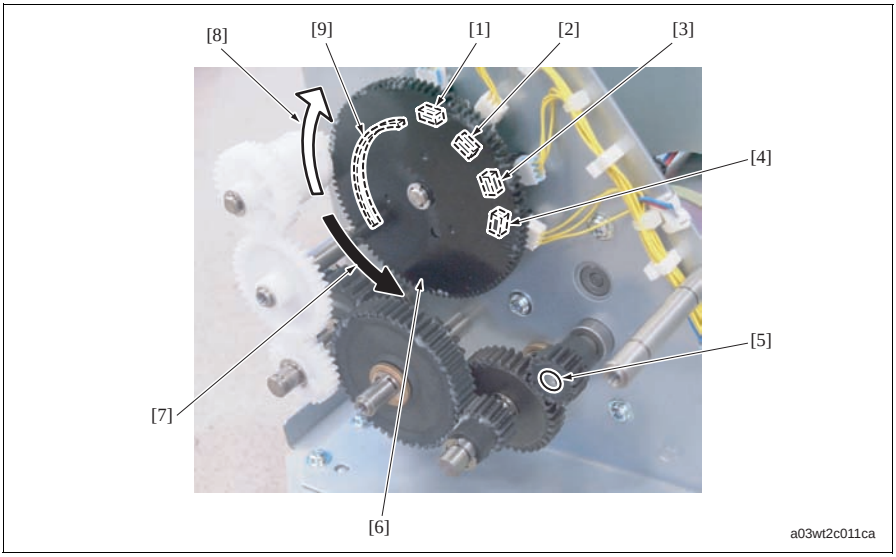
- A paper empty status can be detected by on/off statuses of the upper limit sensor (PS109) [6] and the paper empty sensor (PS108) [1].
- When paper is loaded on the tray, the paper pushes the actuator [2] up as the paper lift plate [4] moves upward and PS108 [1] turns on. Further upward movement of the plate pushes the actuator [5] up and turns PS109 [6] on.
- When no paper exist on the tray, the actuator [2] of PS108 [1] goes into the hole [3] of the paper lift plate [4] instead of being pushed up, and only the actuator [5] is pushed up to turn PS109 [6] on. The status (PS108 is off and PS109 is on) is judged as a paper empty status, and an arrow mark (↓) appears on the tray mark displayed on the touch panel of the main unit.
- When the tray runs out of paper while feeding paper, the status is detected when the PS108 becomes off with PS109 kept on.



[1] Paper empty sensor (PS108)
[2] Actuator of PS108
[3] Hole
[4] Paper lift plate
[5] Actuator of PS109
[6] Upper limit sensor (PS109)

4.3.3 Remaining paper detection control

- The remaining amount of paper is detected by the position of the remaining paper detection gear [6] moved together with the shaft [5] of the paper lift motor (M100) which drives the paper lift plate.
- The remaining paper detection gear incorporates the actuator [9], and the actuator position is detected by the four remaining paper sensors; /1 (PS102) [1], /2 (PS103) [2], /3 (PS104) [3], and /4 (PS105) [4].
- According to on/off statuses of the four sensors, the remaining amount of paper can be figured out.



[1] Remaining paper sensor /1 (PS102)
[2] Remaining paper sensor /2 (PS103)
[3] Remaining paper sensor /3 (PS104)
[4] Remaining paper sensor /4 (PS105)
[5] Shaft of the paper lift motor (M100)
[6] Remaining paper detection gear
[7] Rotational direction when the paper lift plate goes up
[8] Rotational direction when the paper lift plate goes down
[9] Actuator

(1) Sensor detection and remaining paper

- The remaining amount of paper is detected in eight levels according to on/off statuses of the four sensors.
- The number of horizontal lines, or an arrow mark appear on the tray mark displayed on the touch panel of the main unit in order to indicate the remaining amount of paper in the tray.

Remaining paper sensor /1, /2, /3, /4 statuses and remaining amount of paper					
Number of sheets (80g/m^2)	PS102	PS103	PS104	PS105	Indication on the touch panel
1 to 600	OFF	OFF	OFF	OFF	2 lines light
600 to 850	ON	OFF	OFF	OFF	2 lines light
850 to 1100	ON	ON	OFF	OFF	3 lines light
1100 to 1400	ON	ON	ON	OFF	4 lines light
1400 to 1700	ON	ON	ON	ON	5 lines light
1700 to 1950	OFF	ON	ON	ON	6 lines light
1950 to 2250	OFF	OFF	ON	ON	7 lines light
2250 or more	OFF	OFF	OFF	ON	7 lines light

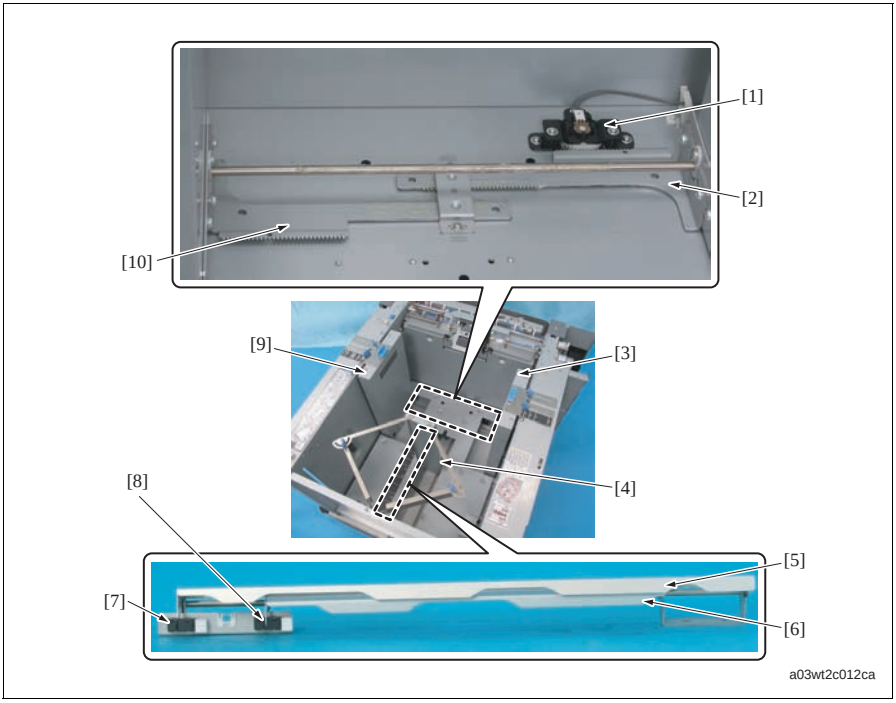
Note

- **The number of sheets shown on the table is approximate values when the paper weight (thickness) is 80g/m^2. It varies depending on the thickness of paper.**

4.3.4 Paper size detection control

A. Outline

- The detection method differs between main scan direction and sub scan direction.
- Paper size in main scan direction is detected by the position of the gear of the paper size VR (VR1) [1] which is rotated by the detection guide plate/Rr [2] mounted on the side guide/Fr [6].
- Paper size in sub scan direction is detected by the paper size sensors /Rr (PS110) [7] and /Fr (PS111) [8]. When the paper rear guide [4] moves, the detection guide plates /1 [5] and /2 [6] are moved upward/downward according to their shape, and the actuators turn PS110 and PS111 on or off.



[1]	Paper size VR (VR1)	[6]	Detection guide plate/2
[2]	Detection guide plate/Rr	[7]	Paper size sensor/Rr (PS110)
[3]	Side guide/Rr	[8]	Paper size sensor/Fr (PS111)
[4]	Paper rear guide	[9]	Side guide/Fr
[5]	Detection guide plate/1	[10]	Detection guide plate/Fr

B. Sensor detection and paper size

- The tables below lists how paper sizes are detected by the paper size VR (VR1), the paper size sensor/Rr (PS110) and /Fr (PS111).

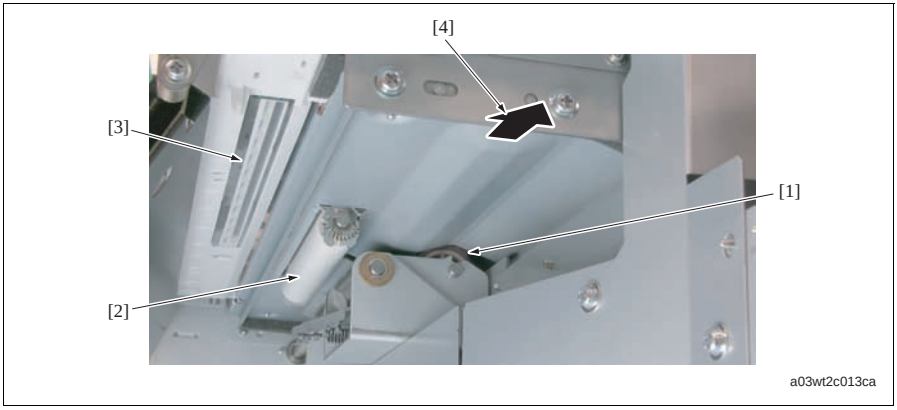
Main scan direction	Sub scan direction				
VR1	PS110	ON	OFF	ON	OFF
	PS111	ON	ON	OFF	OFF
291.1° or lower	13 x 19		SRA3	SPECIAL	SRA4
291.0 to 241.5°	A3		12 x 18	SPECIAL	A4
241.4 to 200.5°	11 x 17		16K	8KS	8½ x 11
200.4 to 141.1°	B5		16K	8KS	B4S
141.1 to 96.9°	SPECIAL		SRA4S	8½ x 11S	8½ x 14S
96.9° or more	A4S		SPECIAL	8½ x 11S	8½ x 14S

ON: Blocks light of the sensor
OFF: Transmits light of the sensor

4.3.5 Centering detection control

A. Outline

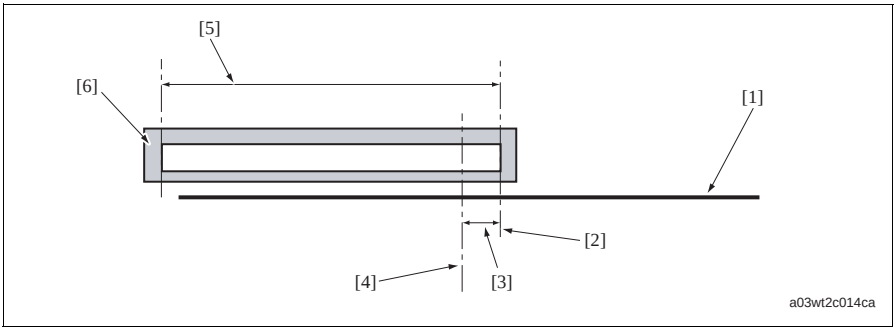
- The position of paper being conveyed is detected by the centering sensor (PS1) [3] and the LU exit sensor (PS107), and the detected result is used in the image processing section to adjust timing to start printing so that the scanned image is properly centered on the paper.
- PS1 detects the edge of the paper in the main scan direction.
- PS107 detects the edge of the paper in the sub scan direction.



[1] Separation roller
[2] Pre-registration roller (driven side)
[3] Centering sensor (PS1)
[4] Front side

B. Detection area

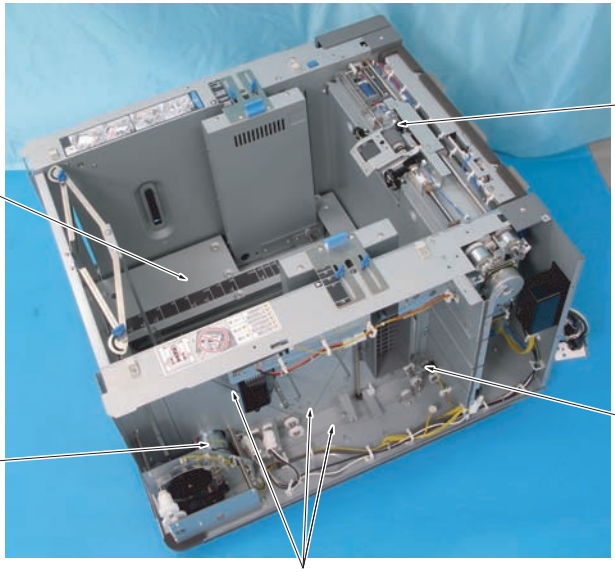
- The detection range [5] of the centering sensor (PS1) [6] is 216 mm in the main scan direction.
- The gap between the center [4] of paper [1] in the main scan direction and the origin point [2] of PS1 is 21.85 mm [3].
- The resolution is 0.125 with 1728 dots.



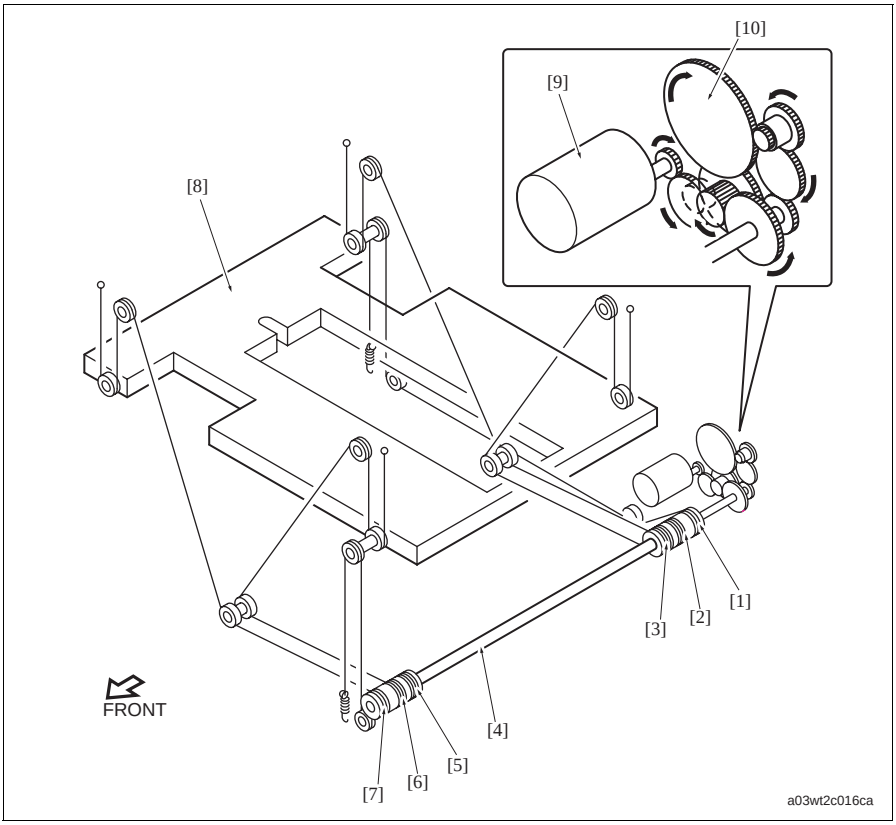
[1] Paper
[2] Origin point of the sensor
[3] Gap between sensor origin and paper center
[4] Center of the paper
[5] Detection range
[6] Centering sensor (PS1)

5. UP/DOWN SECTION

5.1 Configuration



5.2 Drive



[1] Lift wire/Rr1
[2] Lift wire /Rr2
[3] Lift wire/Rr3
[4] Drive shaft
[5] Lift wire/Fr3
[6] Lift wire/Fr2
[7] Lift wire/Fr1
[8] Paper lift plate
[9] Paper lift motor (M100)
[10] Remaining paper detection gear

5.3 Operation

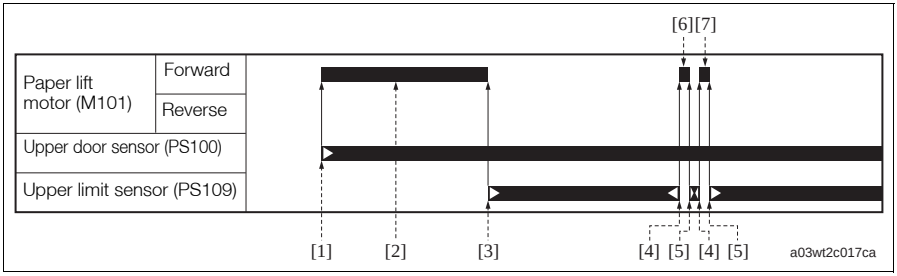
5.3.1 Plate up/down control

A. Mechanism

- Moving the paper lift plate up/down is made by winding/releasing the lift wires with the pulleys driven by the paper lift motor (M100).
- Six lift wires are connected to the paper lift plate (three each on front and back). Two wires each on the front and back of the plate; lift wire/Fr2, /Fr3, /Rr2, /Rr3, lift the paper lift plate, and the other two (one each on front and back); lift wire/Fr1 and /Rr1, pull the plate downward.
- The pulling force of the lift wire/Fr1 and /Rr1 is exerted by the springs and it works to stabilize the paper lift plate.

B. Up operation

- When the upper door sensor (PS100) turns on [1] upon closing of the upper door, the paper lift motor (M100) rotates in forward direction to lift the paper lift plate [2] until the upper limit sensor (PS109) turns on [3].
- When the height of paper stacked in the tray becomes lower as the paper is fed, PS109 becomes off [4] and M100 starts to rotate again in forward direction to lift the paper lift plate until PS109 becomes on [5] again.



[1] Closing of upper door

[2] Paper lift plate goes up

[3] Paper lift plate stops at the upper limit position

[4] The height of stacked paper lowers due to paper feeding

[5] Paper lift plate reaches the upper limit position

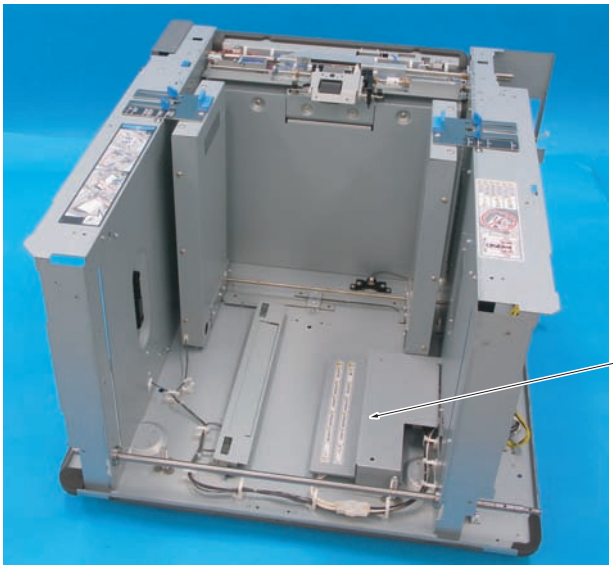
C. Down operation

- When the upper door sensor (PS100) turns off upon opening of the upper door, the paper lift motor (M100) starts to rotate in reverse direction to make the paper lift plate go down by a predetermined amount.
- When the tray down switch (SW100) is pressed while PS100 is off, M100 starts to rotate in reverse direction to lower the paper lift plate by 90 mm.
- After SW100 is pressed, M100 stops when the lower limit sensor (PS101) turns on (detects that the paper lift plate reaches the lower limit position). The paper lift plate does not go down while PS101 is on even if SW100 is pressed.

6. OTHERS

6.1 Dehumidifier heater control

- The LU is equipped with the dehumidifier heater (HTR1) to reduce the moisture inside the LU.
- HTR1 is powered with 220 VAC supplied from the main body, and activated by turning on the dehumidifier heater switch (SW3) on the main body and turning off the sub power switch (SW2)



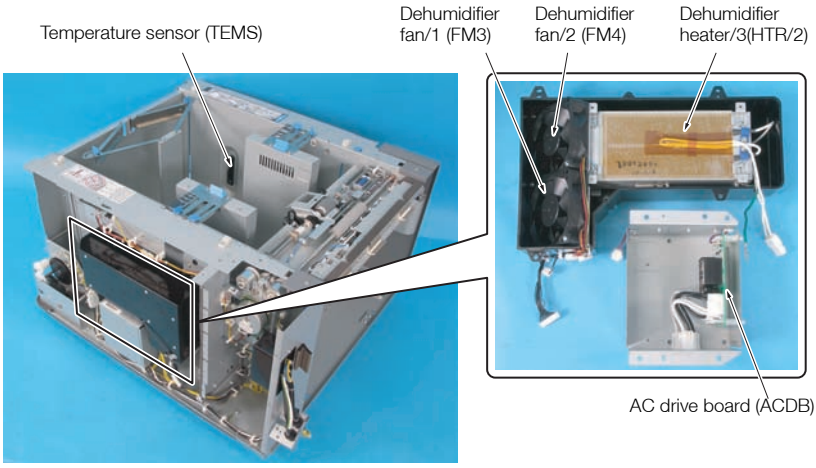
[1] Dehumidifer heater (HTR1)

6.2 Interlock control

- The interlock switch/1 (MS1) and the front door sensor (PS115) are mounted on the front door, and the interlock switch/2 (MS2) and the upper door sensor (PS100) are mounted on the upper door.
- The power to drive the paper feed motor (M1) is transmitted via MS1 and the MS2. If the front door or the upper door is opened, MS1 and MS2 turn off to cut the power supply to the paper feed motor (M1).
- When PS115 and PS100 turn off while paper being fed, the LU drive board (LUDB) changes M1 drive signal into off in order to stop the paper feeding.

7. HT-503 (OPTIONAL)

7.1 Configuration



7.2 Operation

7.2.1 Dehumidifier fan heater control

A. Outline

- The fan heater (HTR3) and the dehumidifier fan/1 (FM3) and /2 (FM4) generate hot airflow inside the LU and reduce moisture in order to prevent jam of coated paper due to dampness.
- The dehumidifier control has two processes; a dehumidifier fan heater pre-drying and the temperature limiting dehumidification control. The first one (pre-drying) is made with HTR3 , FM3 and FM4. Once the target temperature rise is achieved, the pre-drying process is finished and further dehumidification control limiting the temperature is carried out only by HTR3.
- The dehumidification control is carried out according to the temperature inside the tray detected by the temperature sensor (TEMS), and continued until the target temperature rise is achieved.
- Feeding paper from the LU cannot be made while the dehumidification control being performed. (this can be allowed by changing DIPSW setting)

B. Dehumidifier fan heater pre-drying control

- The user setting menu has an option to activate pre-drying with the dehumidifier fan heater before printing every time the upper door is opened/closed.
- When the pre-drying with the dehumidifier fan heater is set not to be activated in the user setting menu, the pre-drying before printing is carried out if the upper door is opened/closed and a change in remaining amount of paper is detected.
- HTR3, FM3, and FM4 turn on when 56% or higher ambient humidity is detected by the temp/humidity sensor/1 (TEM/HUMS/1) of the main unit.
- FM3 and FM4 are turned on at regular intervals, and kept on for a specified time period.

C. Triggers for dehumidification control

- When the sub power switch (SW2) is turned on with the dehumidifier fan heater setting set to [Automatic] or [On (compulsory)], and with the paper type set to coated paper.
- After the upper door is opened/closed with the dehumidifier fan heater setting set to [Automatic] or [On (compulsory)], and with the paper type set to coated paper.
- When the paper type is changed to coated paper from other paper type with the dehumidifier fan heater setting set to [Automatic] or [On (compulsory)].
- When the dehumidifier fan heater setting is changed to [Automatic] from [Off (compulsory)], or changed to [On (compulsory)].

D. Temperature limiting dehumidification control

- After the pre-drying is finished, the HTR3 is turned on or off to keep the target temperature.

Ambient humidity	Target temperature rise in the tray
Lower than 55%	Not controlled
56 to 60%	6°C
61 to 65%	7°C
66 to 70%	8°C
71 to 75%	9°C
Higher than 76%	10°C

E. Conditions to stop the dehumidification control

- When other than coated paper is selected as the paper type while the control is in progress.
- When the dehumidifier fan heater setting is changed to [Off (compulsory)] while the control is in progress.

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

RU-503/504

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

2006/09	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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RU-503/504

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4.3.3 Fan control 15

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	Conveyance unit with paper cooling and decurler functions

B. Functions

(1) Functions

Accelerated conveyance mode	To accelerate for the finisher standard line speed.
Decurler conveyance mode	Reduces paper curl and conveys at an accelerating rate with posttreatment linear velocity.

(2) Operation capacity

65PPM (A4, B5, 8½ x 11, 16K)

C. Paper type

Paper size	SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5, B5S, A5, A5S, B6S, A6S 13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8 ½S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS Tab paper (A4, 8½ x 11) Custom paper (Max. 330 x 487mm, Min. 100 x 148 mm)	
Paper type	Plain paper, high quality paper, color paper, coated paper, tab paper (five-tab type): same as the main body.	
Paper weight	Accelerated conveyance mode	64 to 300g/m^2
	Decurler conveyance mode	64 to 209g/m^2

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	RU-503	24/5V DC (supplied from the main body)
	RU-504	AC100 to 240V/5V DC (supplied from the main body)
Maximum power consumption	90VA or less	
Dimensions	Including main body: 175 (W) x 723 (D) x 1 (H) mm	
Weight	RU-503	Approx. 33 kg
	RU-504	Approx. 35 kg

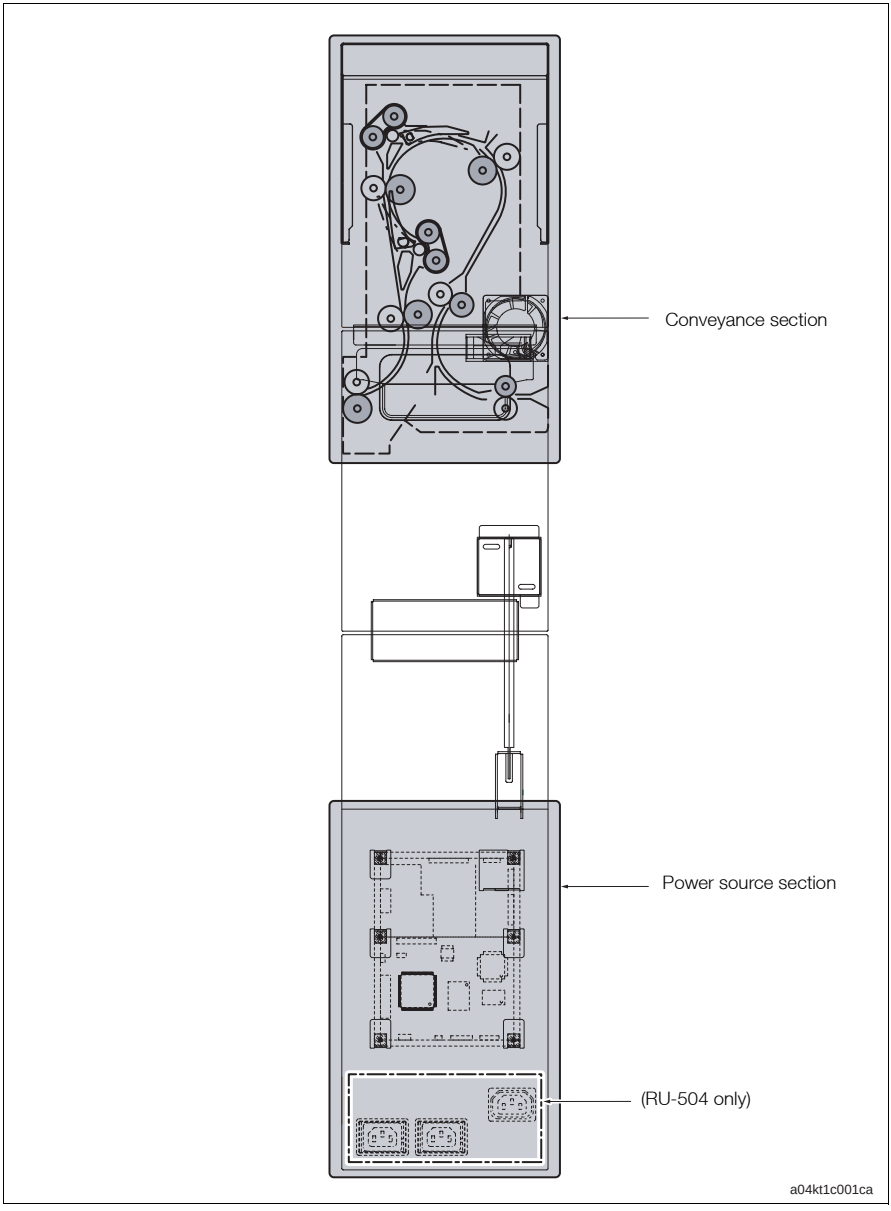
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80%RH (with no condensation)

Note

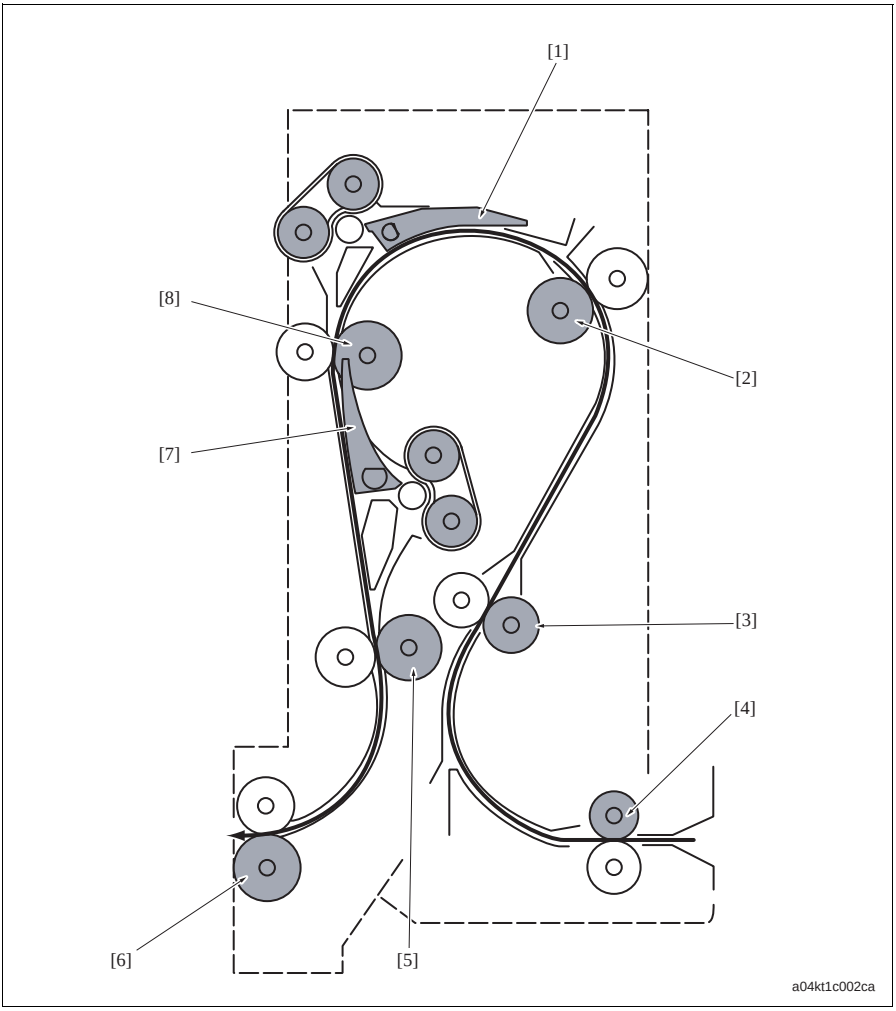
- **The information herein may be subject to change for improvement without notice.**

2. UNIT CONFIGURATION DIAGRAM



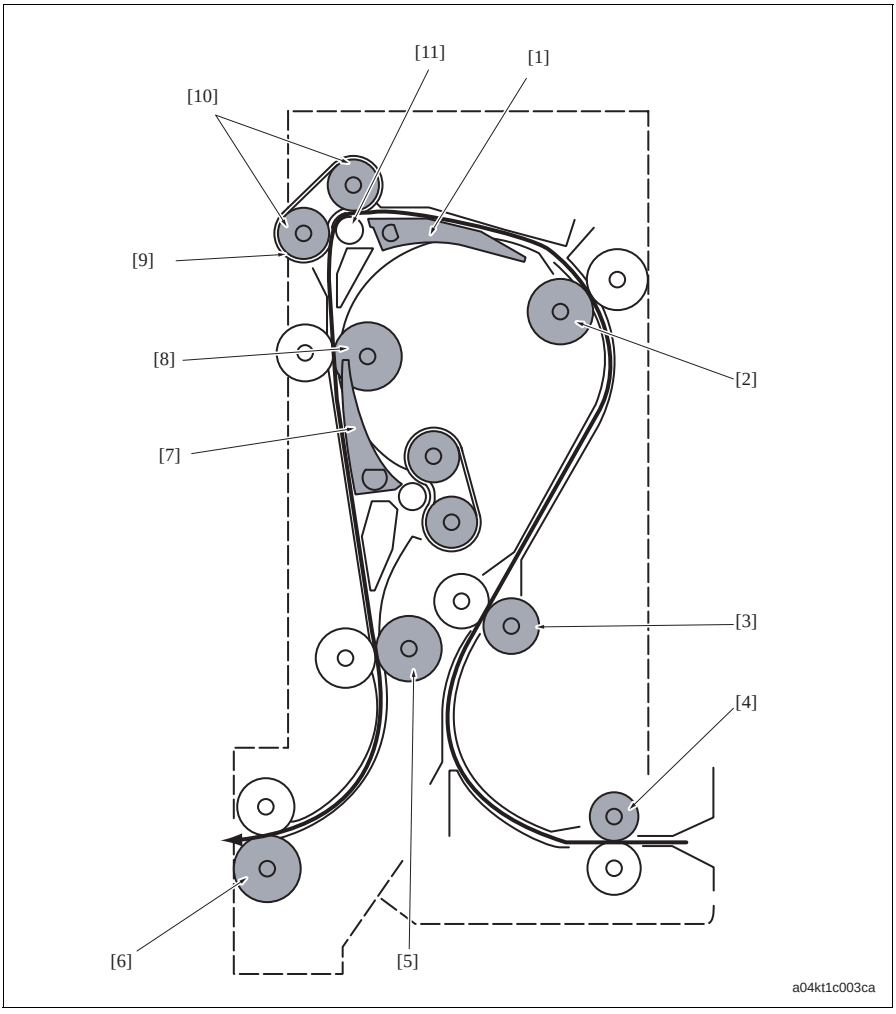
3. PAPER PATH

A. Accelerated conveyance mode (Normal mode)



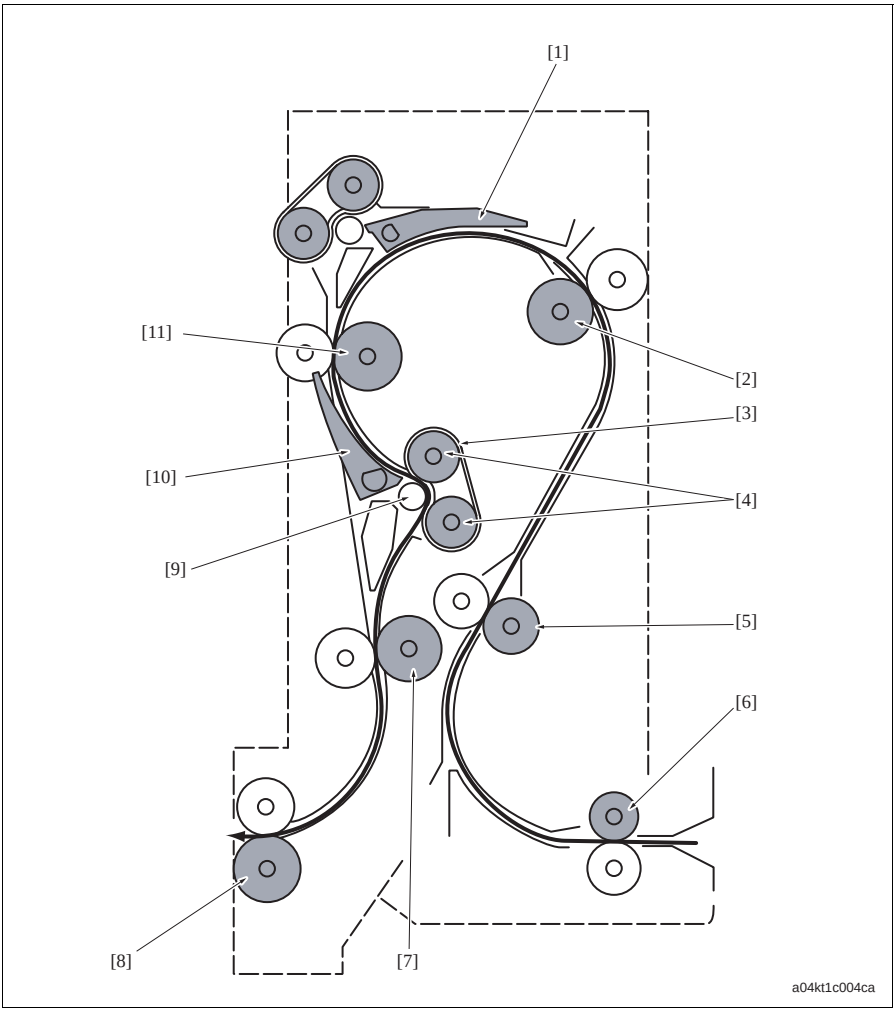
[1] Decurler gate /1
[2] Intermediate roller /1
[3] Entrance roller /2
[4] Entrance roller /1
[5] Intermediate roller /3
[6] Paper exit roller
[7] Decurler gate /2
[8] Intermediate roller /2

B. Decurler conveyance mode (straightening the upward curling)



[1] Decurler gate /1
[2] Intermediate roller /1
[3] Entrance roller /2
[4] Entrance roller /1
[5] Intermediate roller /3
[6] Paper exit roller
[7] Decurler gate /2
[8] Intermediate roller /2
[9] Decurler belt /1
[10] Decurler roller /1
[11] Decurler roller /2

C. Decurler conveyance mode (straightening the downward curling)

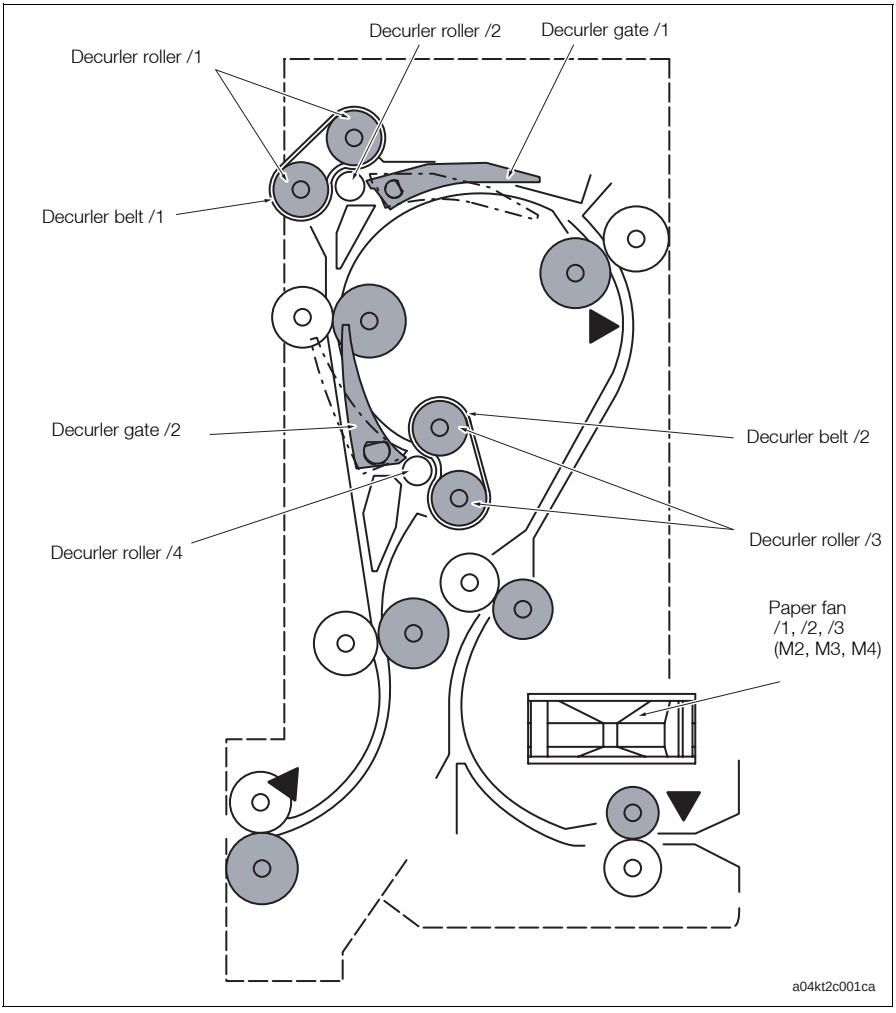


[1] Decurler gate /1
[2] Intermediate roller /1
[3] Decurler belt /2
[4] Decurler roller /3
[5] Entrance roller /2
[6] Entrance roller /1
[7] Intermediate roller /3
[8] Paper exit roller
[9] Decurler roller /2
[10] Decurler gate /2
[11] Intermediate roller /2

■ CONFIGURATION/OPERATION

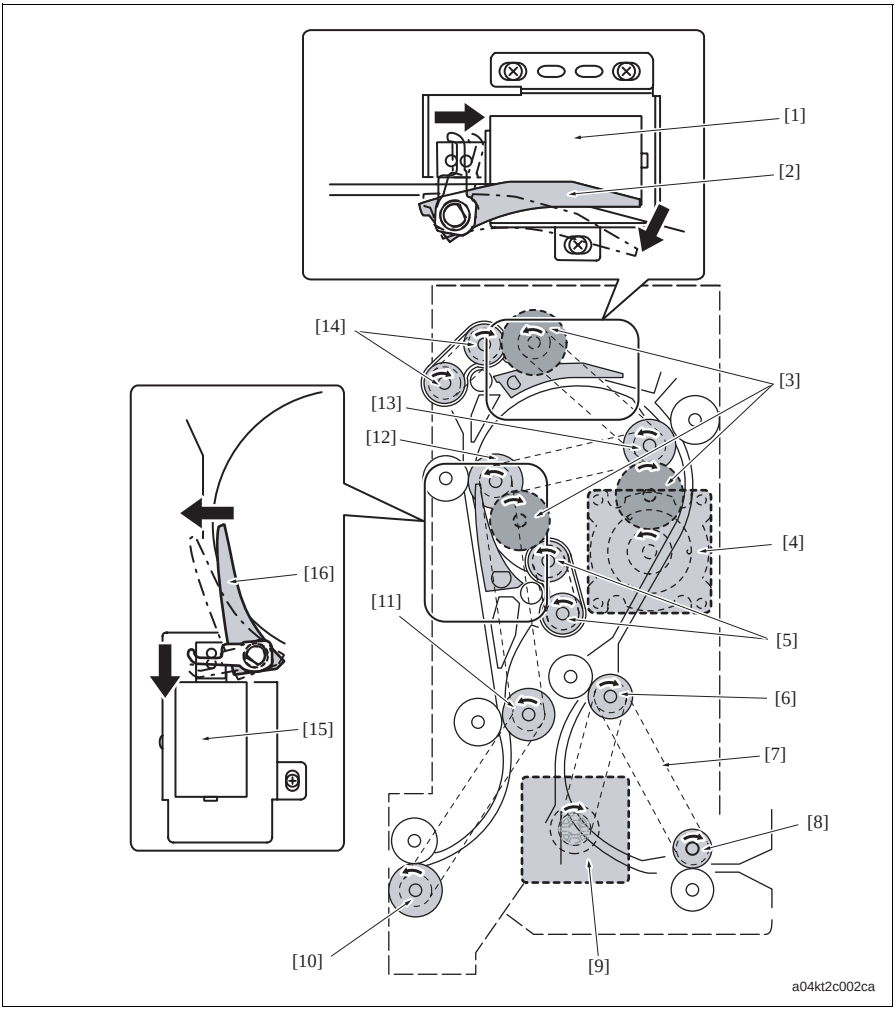
4. CONVEYANCE SECTION

4.1 Configuration



4.2 Drive

4.2.1 Conveyance drive

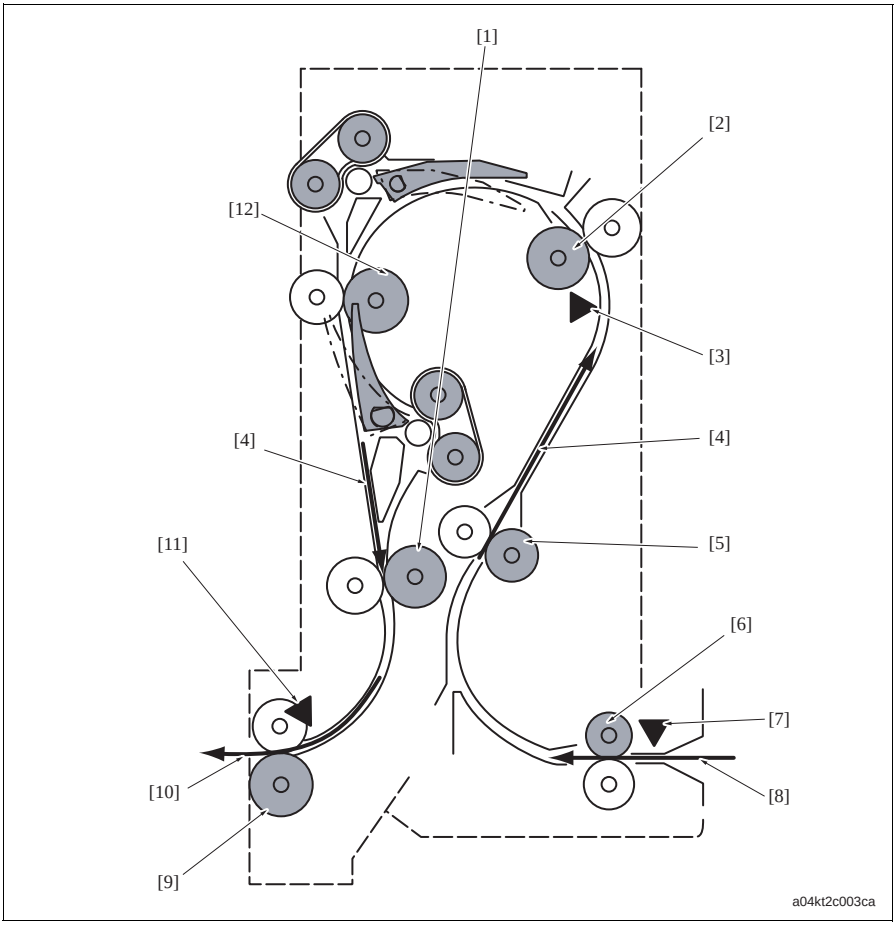


[1] Decurler gate solenoid /1 (SD2)
[2] Decurler gate /1
[3] Gear
[4] Paper exit motor (M5)
[5] Decurler roller /2
[6] Entrance roller /2
[7] Belt
[8] Entrance roller /1
[9] Entrance conveyance motor (M1)
[10] Paper exit roller
[11] Intermediate roller /3
[12] Intermediate roller /2
[13] Intermediate roller /1
[14] Decurler roller /1
[15] Decurler gate solenoid /2 (SD3)
[16] Decurler gate /2

4.3 Operation

4.3.1 Conveyance control

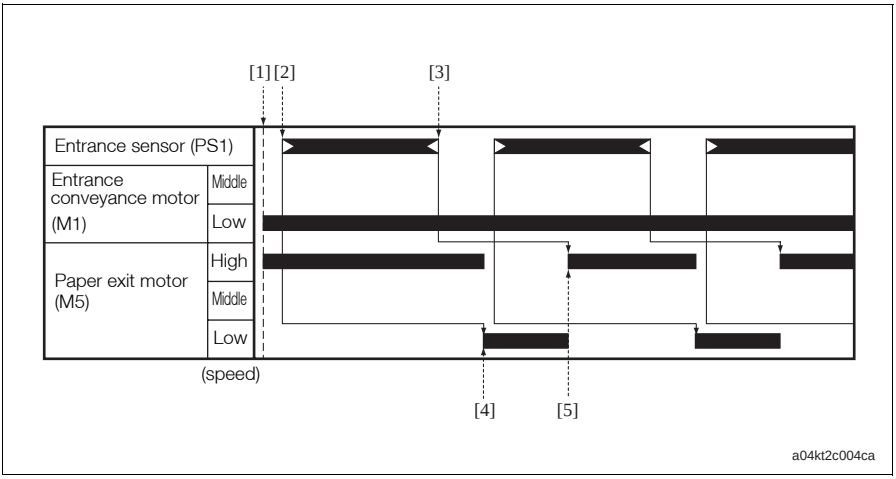
- The entrance conveyance motor (M1) controls the rotation of the entrance rollers /1 [6] and /2 [5].
- The paper exit motor (M5) controls the rotation of the intermediate rollers /1 [2], /2 [12], /3 [1] and the paper exit roller [9].
- The paper ejected from the main body is conveyed to the RU section by the entrance roller /1 [8]. Then the intermediate roller conveys the paper [4], and then paper exit roller exits it [10].
- The intermediate sensor (PS2) [3] detects paper jam.



[1] Intermediate roller /3
[2] Intermediate roller /1
[3] Intermediate sensor (PS2)
[4] Conveyance by the intermediate roller
[5] Entrance roller /2
[6] Entrance roller /1
[7] Entrance sensor (PS1)
[8] Conveyance to the RU section
[9] Paper exit roller
[10] Paper exit from the RU section
[11] Paper exit sensor (PS3)
[12] Intermediate roller /2

A. Straight mode

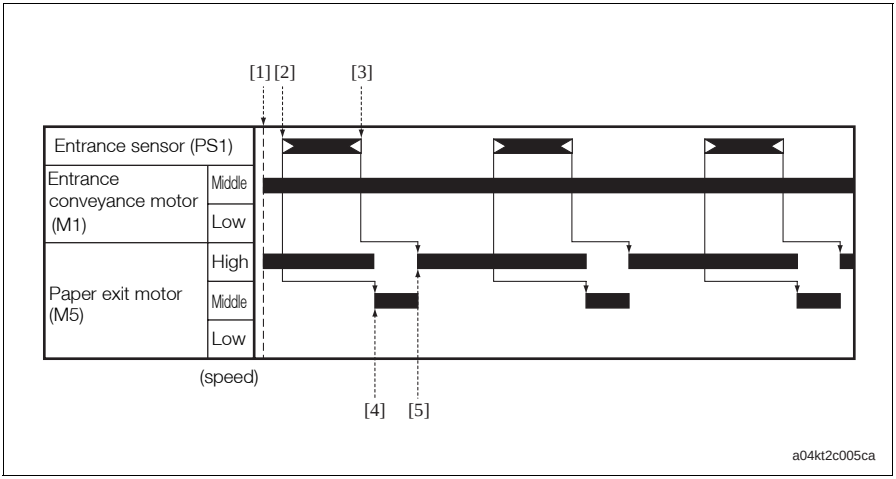
1. The entrance conveyance motor (M1) and the paper exit motor (M5) turn ON when a start-printing signal is sent from the main body. Then, M1 rotates at the same rate as the line speed of the main body while M5 rotates at high speed.
2. The M5 reduces the speed at the same rate as that of the M1 after the predetermined time has passed since the entrance sensor (PS1) detected the edge of the paper.
3. The M5 rotates at high speed again after the predetermined time has passed since the PS1 detected the rear end of the paper.
4. M1 and M2 stop the operation after predetermined time has passed since the paper exit sensor (PS3) detected the trailing edge of the last paper.



[1] Start-printing signal ON
[2] Paper leading edge detection
[3] Paper trailing edge detection
[4] Decelerating at low speed
[5] Accelerating at high speed

B. Reverse paper exit mode

- Each control timing is the same as in the straight mode.



[1] Start-printing signal ON

[2] Paper leading edge detection

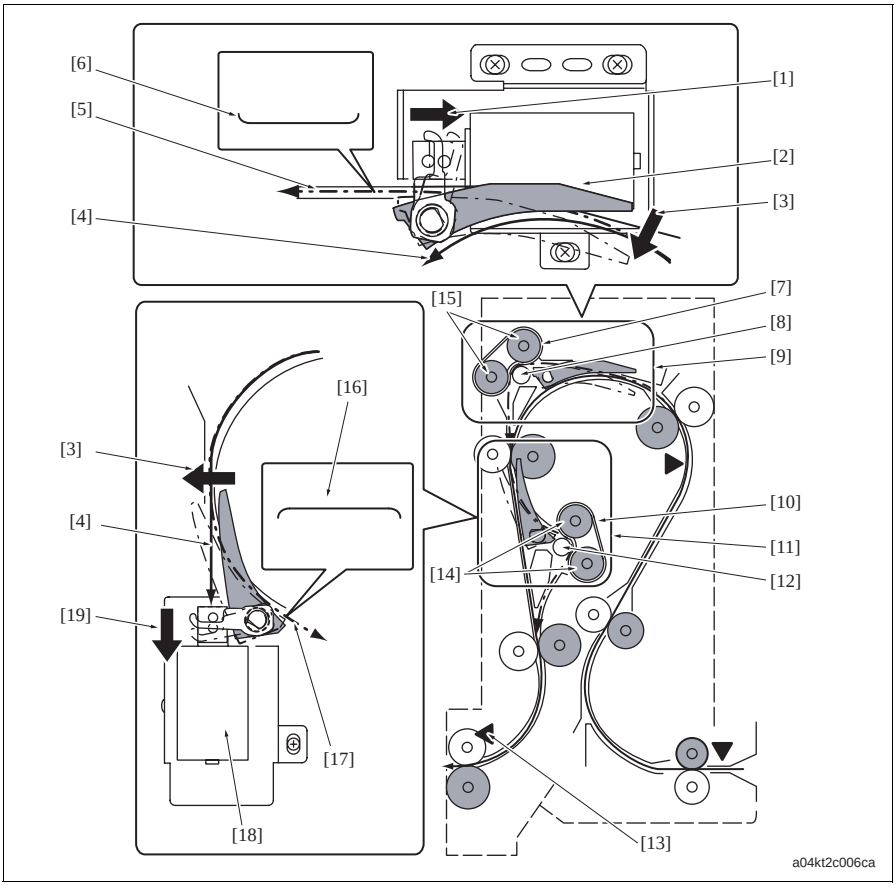
[3] Paper trailing edge detection

[4] Decelerating at middle speed

[5] Accelerating at high speed

4.3.2 Decurler control

- The paper exit motor (M5) controls the rotation of the decurler rollers /1 [15] and /3 [14]
- Conveys paper into between the decurler belt /1 [7], /2 [10], and decurler roller /2 [8], /4 [12] and gives pressure to remove the curl of the paper.
- The decurler /Up [9] exerts a pressure on the paper curled upward (valley curl) [6] while the decurler /Lw [11] exert a pressure on the paper curled downward (mount curl) [16].
- There are three modes for paper curl straightening: Upward paper curl straightening ON (Conveys toward the decurler /Up [5]), Downward paper curl straightening ON (Conveys toward the decurler /Lw[17]), Decureler OFF (The paper through the normal path [4])
- Switching paper curl straightening mode is made in the service mode and Adjustment Menu-Finisher Adjustment.



[1] Decurler gate solenoid /1 (SD2) ON
[2] Decurler gate solenoid /1 (SD2)
[3] Switching paper through path
[4] Paper through path (normal path)
[5] Paper through path (toward the decurler / Up)
[6] The paper curled upward
[7] Decurler belt /1
[8] Decurler roller /2
[9] Decurler /Up
[10] Decurler belt /2
[11] Decurler /Lw
[12] Decurler roller /4
[13] Paper exit sensor (PS3)
[14] Decurler roller /2
[15] Decurler roller /3
[16] The paper curled downward
[17] Paper through path (toward the decurler / Lw)
[18] Decurler gate solenoid /2 (SD3)
[19] Decurler gate solenoid /2 (SD3) ON

A. Decurler /Up control

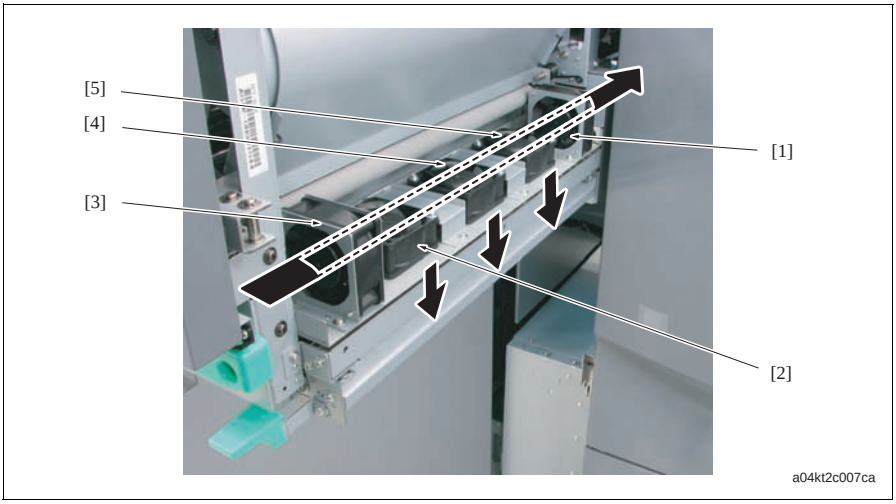
- When the upward paper curl straightening ON in the service mode and Adjustment Menu-Finisher Adjustment setting, a start-printing signal is sent form the main body and the decurler gate solenoid /1 (SD2) starts operating. Then it switches the direction of paper conveyance path toward the decurler /Up.
- The paper conveyance path is switched to the normal path when the SD2 is OFF. When the SD2 is ON, the path is switched toward the decurler /Up.
- SD2 stop the operation after predetermined time has passed since the paper exit sensor (PS3) detected the trailing edge of the last paper.

B. Decurler /Lw control

- When the downward paper curl straightening ON in the service mode setting, a start-printing signal is sent form the main body and the decurler gate solenoid /2 (SD3) starts operating. Then it switches the direction of paper conveyance path toward the decurler /Lw.
- The paper conveyance path is switched to the normal path when the SD3 is OFF. When the SD3 is ON, the path is switched toward the decurler /Lw.
- SD2 stop the operation after predetermined time has passed since the paper exit sensor (PS3) detected the trailing edge of the last paper.

4.3.3 Fan control

- There are five fans: Paper fan /1, /2 and /3 (M2, M3 and M4) [2] [4] [5] Ventilation assist fan /1 and /2 (M6 and M7) [3] [1]
- The paper fans reduce unevenness of the wax on the paper by blowing and cooling down the paper with air.
- The ventilation assist fan intakes fresh air and exhausts heat around the paper exit section.



[1] Ventilation assist fan /2 (M7)
[2] Paper fan /1 (M2)
[3] Ventilation assist fan /1 (M6)
[4] Paper fan /2 (M3)
[5] Paper fan /3 (M4)

A. Paper fan control

- When a start-printing signal is sent from the main body, the paper fans (M2, M3 and M4) start to rotate.
- As the paper exit sensor (PS3) detects the trailing edge of the last paper, M2, M3 and M4 are turned off.

B. Exhaust assist fan control

- When a start-printing signal is sent from the main body, the ventilation assist fans (M6 and M7) start to rotate.
- As the paper exit sensor (PS3) detects the trailing edge of the last paper, M6 and M7 are turned off.

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KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

FD-501

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 2.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show ⚠1 to the left of the revised section.
  A number within ⚠1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2006/09	2.0	⚠1	Revision in relation to launching of C6500
2004/10	1.0	—	Issue of the first edition

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	Multi folding device with punch and PI functions

B. Functions

(1) Functions

Normal paper exit function	Transfer paper exited from the main body is exited into the main tray/sub tray.
Punching function	Transfer paper that is exited by the main body or fed to the PI is punched for each sheet of paper and exited into the main tray/sub tray.
Folding function	Transfer paper that is exited from the main body or fed to the PI is handled for folding (either one of the following: Z-fold, Letter fold-out, Letter fold-in, Double parallel fold, Gate fold, and folding) for each sheet of paper, and exited into the sub tray/main tray (The Z-fold exit to the main tray while in the FS connection is limited only to B4, A3, 8½ x 14, 11 x 17, 12 x 18 and 8K.)
PI insertion function	PI tray paper is inserted in the transfer paper exited from the main body.
Manual mode	PI tray paper is punched, folded and stapled, and then exited into the sub tray/ main tray. (The stapling function is available only when the staple unit is connected to the downstream of the FD.)

⚠ (2) Maximum tray capacity

Main tray (weighing 50 to 244 g/m^2)	2,500 sheets: A4, A4S, B5, B5S 8$^1/_2$ x 11, 8$^1/_2$ x 11S 16K*3, 16KS*3 1,500 sheets: SRA3*2, A3, B4, SRA4*2, SRA4S*2 13 x 19*2,12 x 18, 11 x 17, 8$^1/_2$ x 14 8$^1/_2$ x 13, 8$^1/_4$ x 13, 8$^1/_8$ x 13$^1/_4$ 8K*3 wide paper*1 : A3, B4,A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8$^1/_2$ x 11, 8$^1/_2$ x 11S, 5$^1/_2$ x 8$^1/_2$ size entry: (Max. 324 x 460 mm) 500 sheets: A5, A5S*2, B6S*2 5$^1/_2$ x 8$^1/_2$*1, 5$^1/_2$ x 8$^1/_2$S*2 Tab paper*4 : A3, B4, A4, A4S, B5, B5S,11 x 17, 8$^1/_2$ x 11,8$^1/_2$ x 11S, custom paper (Max. 324 x 460 mm, Min. 182 x 140mm) Custom paper : 1050 (Max. 324 x 460 mm, Min. 182 x 140mm) C6500 (Max. 330 x 483 mm, Min. 128 x 148mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 C6500: only A4 and 8$^1/_2$ x11. Operation of paper exit with tab area at the trail edge side is not assured.
Sub tray *1 (weighing 50 to 300 g/m^2)	SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5, B5S, A5, A5S, B6S, A6S 13 x 19, 12 x 18, 11 x 17, 8$^1/_2$ x 14, 8$^1/_2$ x 11, 8$^1/_2$ x 11S, 5$^1/_2$ x 8$^1/_2$, 5$^1/_2$ x 8$^1/_2$S, 8$^1/_2$ x 13, 8$^1/_4$ x 13, 8$^1/_8$ x 13$^1/_4$, 8 x 13 8K*2, 16K*2, 16KS*2 Tab paper*3 : A4, 8$^1/_2$ x 11, custom paper Custom paper : Max. 330 x 487 mm, Min. 100 x 148mm *1 C6500 only *2 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *3 Operation of paper exit with tab area at the trail edge side is not assured.

(3) Processing capacity

105PPM

C. Type of paper

(1) Punching function

⚠	Paper size	2 holes:	A3, B4, SRA4S[*2], A4, A4S, B5, B5S, A5, A5S[*2] 12 x 18 , 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½[*1] 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K[*3], 16K[*3], 16KS[*3], Tab paper[*4] : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8½ x 11, 8½ x 11S, custom paper (Max. 324 x 460 mm, Min. 182 x 140mm)
		3 holes/4 holes:	A3, B4, A4, B5 12 x 18 , 11 x 17, 8½ x 11 8K[*3], 16K[*3] Tab paper[*4] : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8½ x 11, 8½ x 11S, custom paper (Max. 324 x 460 mm, Min. 182 x 140mm)
		*1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 A4, 8½ x 11 only for C6500	
	Applicable paper	Plain paper, tab paper	
	Paper weight	50 to 209 g/m^2	

(2) Folding functions

⚠	Paper size	A3, B4, SRA4S[*1], A4S 12 x 18, 11 x 17, 8½ x 14, 8½ x 11S 8K[*2] Custom paper[*1]: (Max. 305 x 458 mm, Min. 210 x 279mm) *1 C6500 only *2 C6500: supported in all the destinations. 1050: only supported in Taiwan and China.	
	Applicable paper	Plain paper	
	Paper weight	Folding, Letter fold-in, Letter fold-out, Z-fold	50 to 130 g/m^2
		Double parallel fold, Gate fold	50 to 91 g/m^2

(3) PI functions

⚠	Paper size	SRA3*2, A3, B4, SRA4*2, SRA4S*2, A4, A4S, B5, B5S, A5 13 x 19*2, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½ 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K*3, 16K*3, 16KS*3 Tab paper*4 : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8½ x 11, 8½ x 11S, custom paper (Max. 324 x 460 mm, Min. 182 x 140mm) Custom paper*2 : Max. 330 x 483 mm, Min. 182 x 148mm Wide paper*1 : A3, B4, A4, A4S, B5, B5S, A5, 12 x 18,11 x 17, 8½ x 11, 8½ x 11S, 5½ x 8½, size entry: (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 A4, 8½ x 11 only for C6500
⚠	Applicable paper	Plain paper, high-quality paper, trace paper, coated paper
	Paper weight	50 to 300 g/m^2
	Maximum tray capacity	500 sheets (80 g/m^2) x 2 trays

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source (for metric area)	230 VAC, DCS 5V (5V DCS is supplied from the main body.) AC100, 240V, DC5V (DC5V is supplied from the main body.)
Power source (for inch area)	200 VAC, DCS 5V (5V DCS is supplied from the main body.)
Maximum power consumption	180 VA or less
⚠ Dimensions	400 (W) x 723 (D) x 1231 (H) mm (The main tray is not included in the width)
Weight	Approx. 130 kg

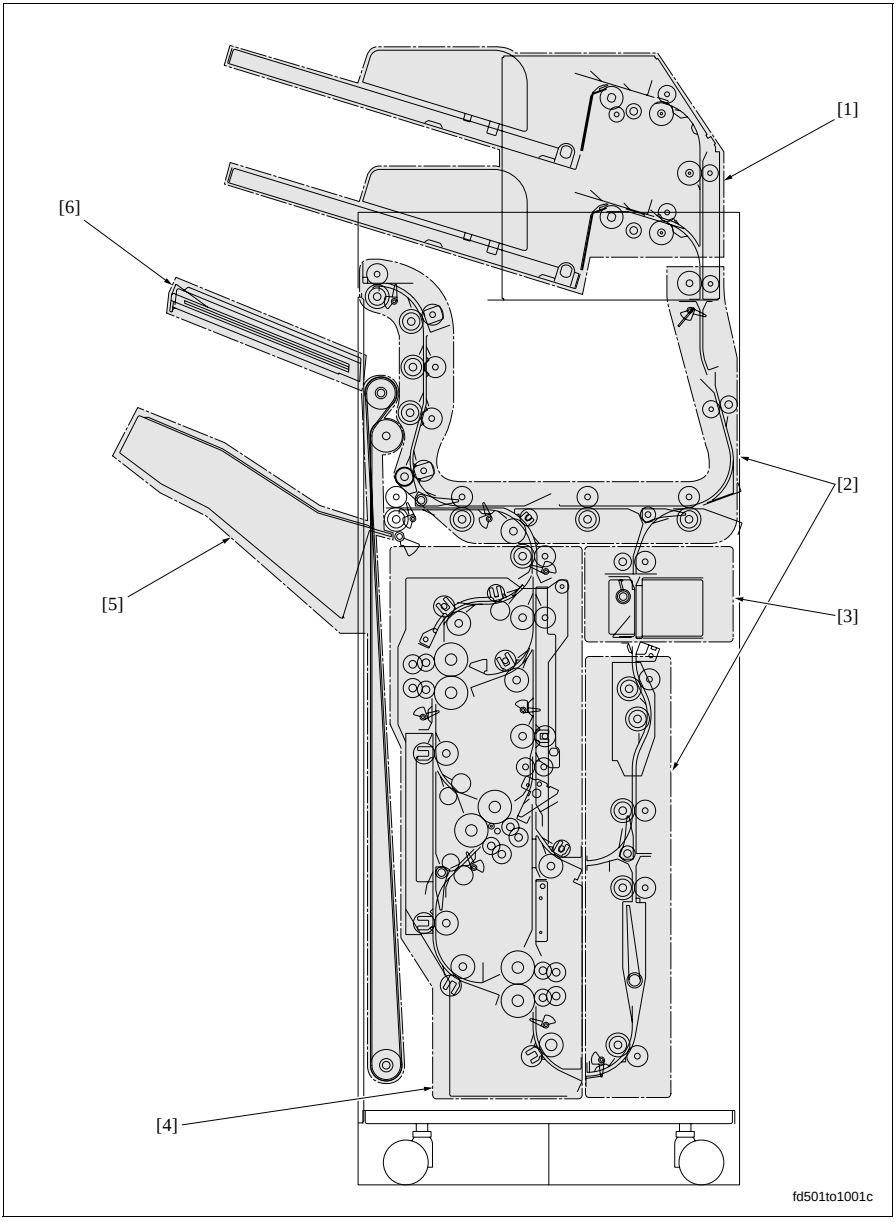
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

Note

- **The information herein may be subject to change for improvement without notice.**

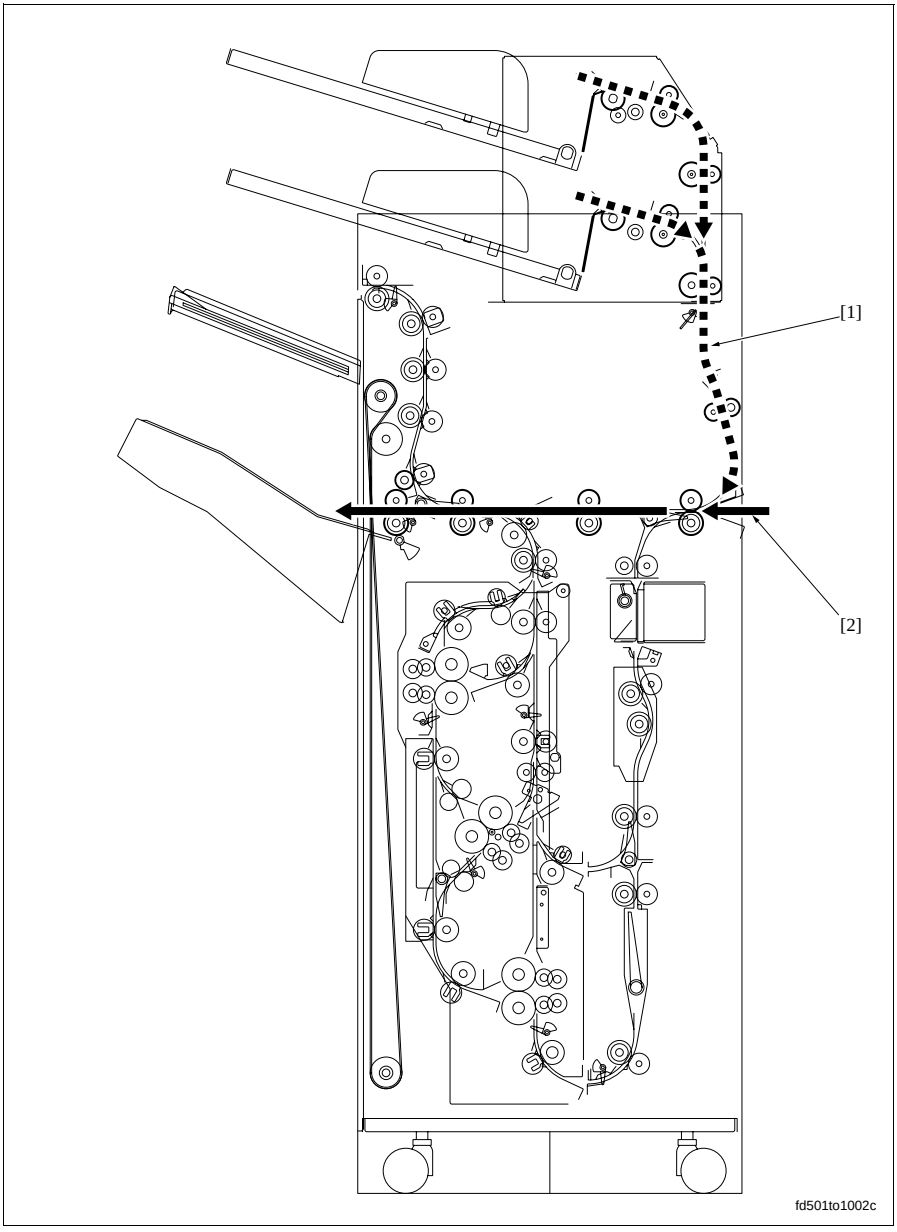
2. UNIT COMPOSITION



⚠ [1] PI section
[2] Conveyance section
[3] Punch section
[4] Folding conveyance section
[5] Main tray section
[6] Sub tray section

3. PAPER PATH

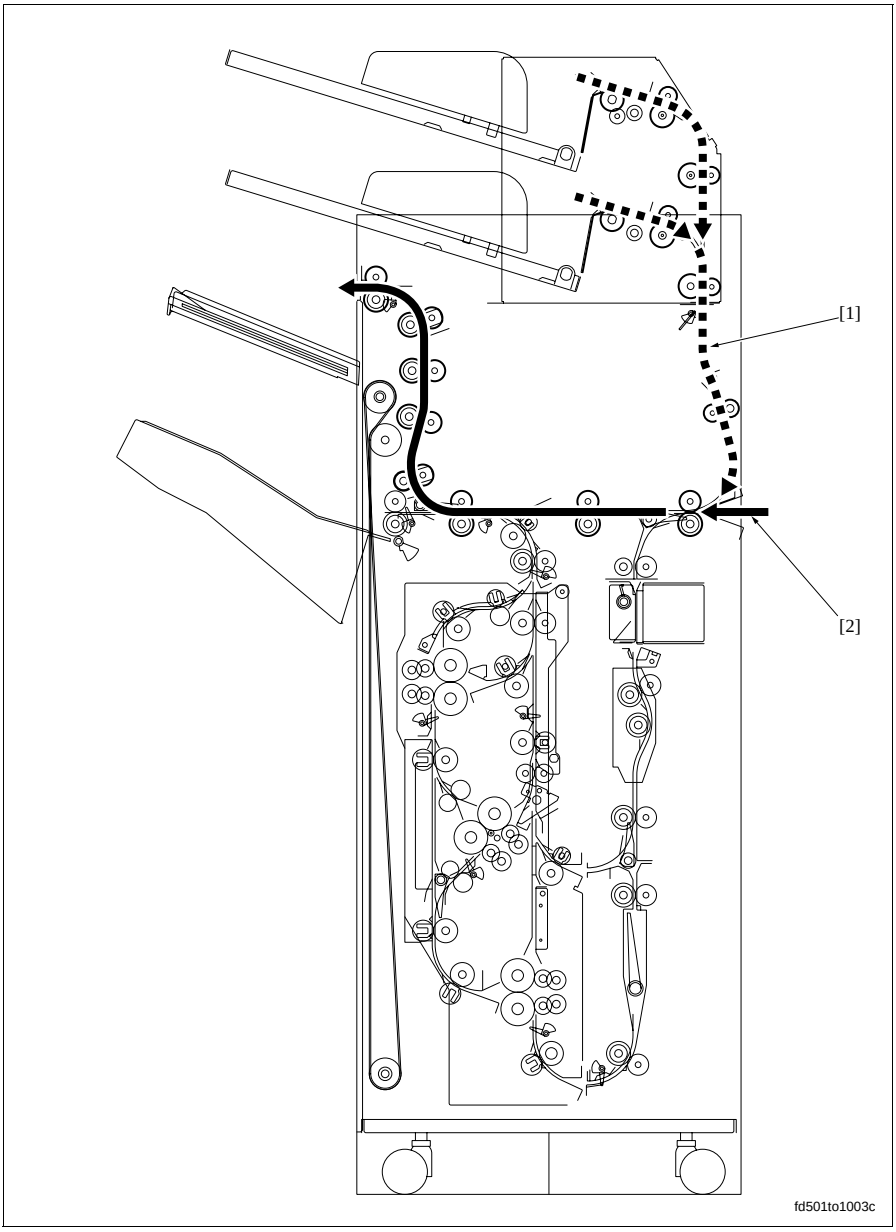
A. Straight mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

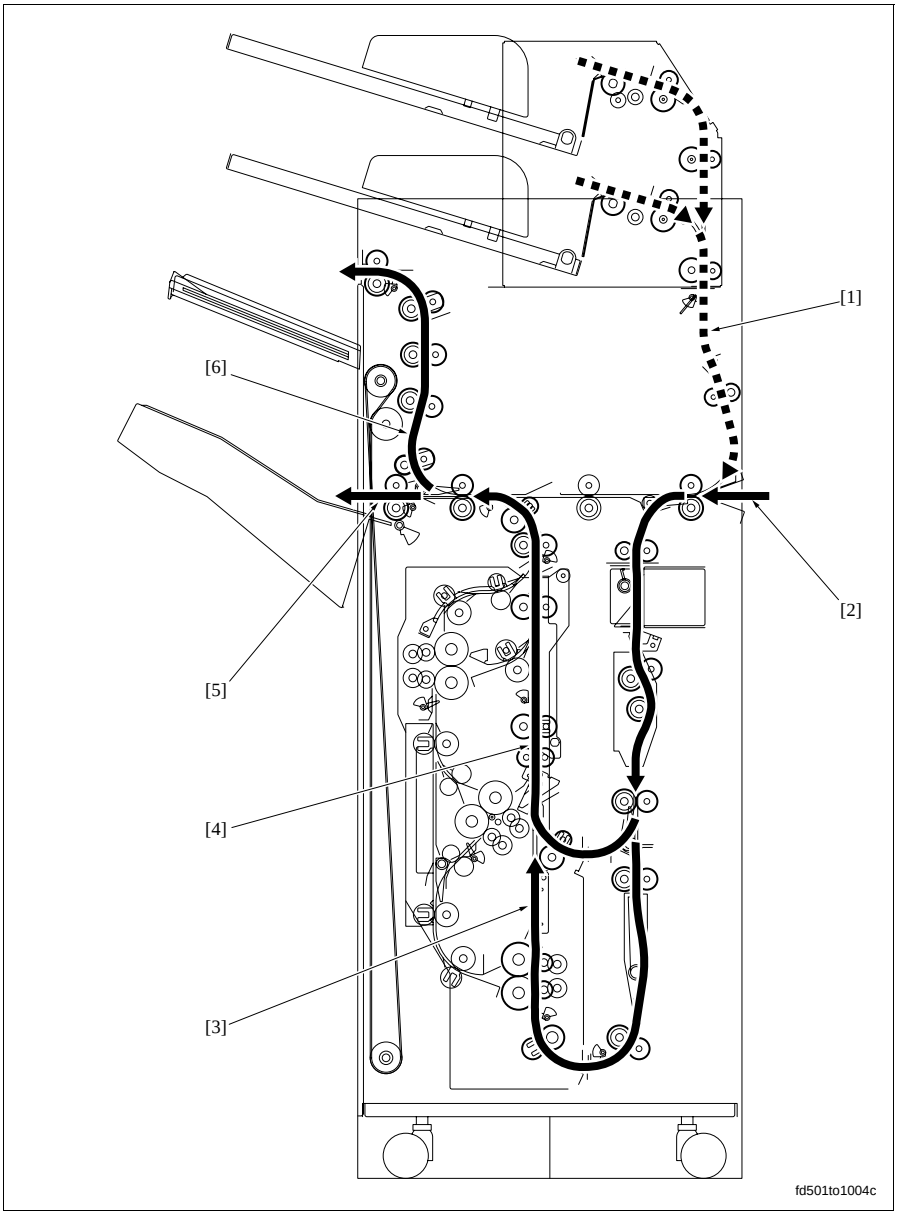
B. Sub tray mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

C. Punch mode (L and S sizes)



[1] Paper through from the PI

[2] Paper through from the main body paper exit

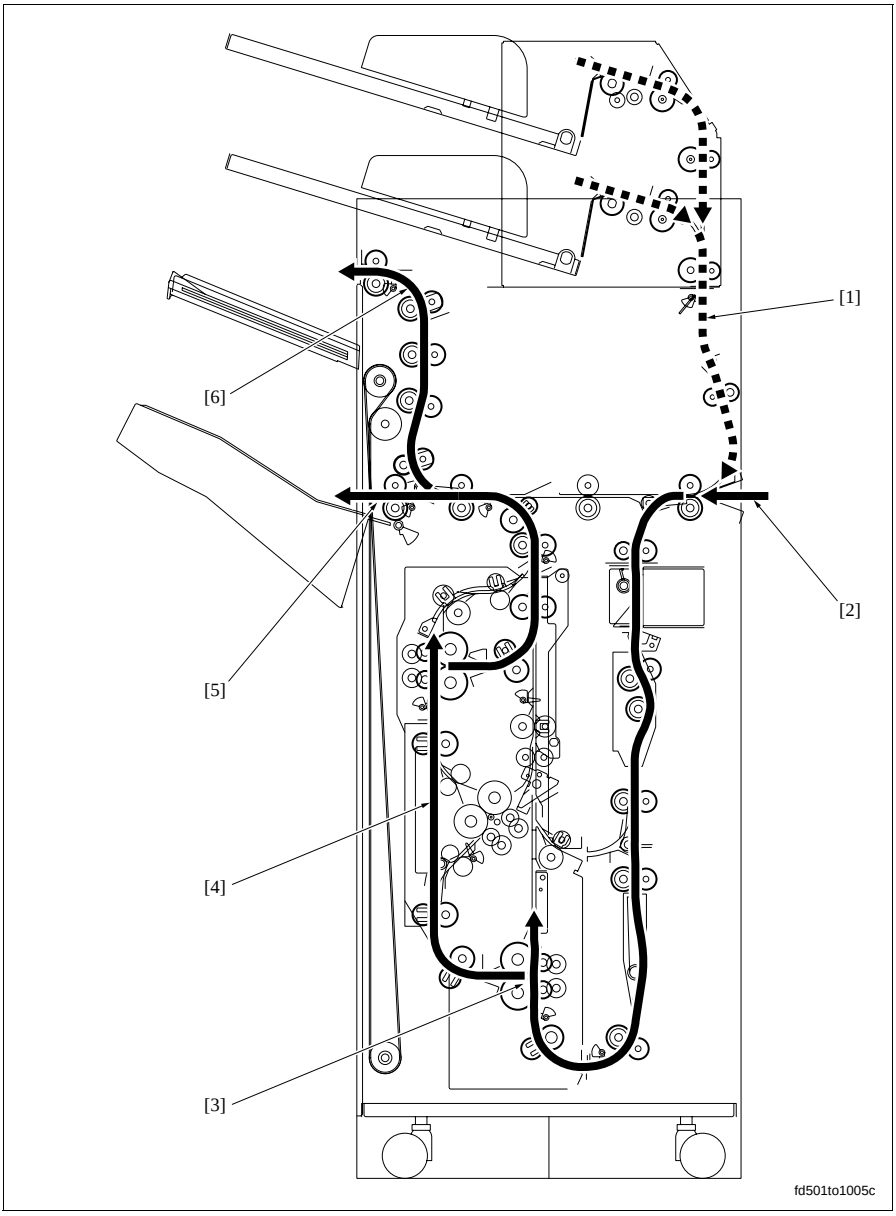
[3] In the case of a L size

[4] In the case of a S size

[5] Paper exit to the main tray, paper through to the next option

[6] Paper exit to the sub tray

D. Z-fold mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

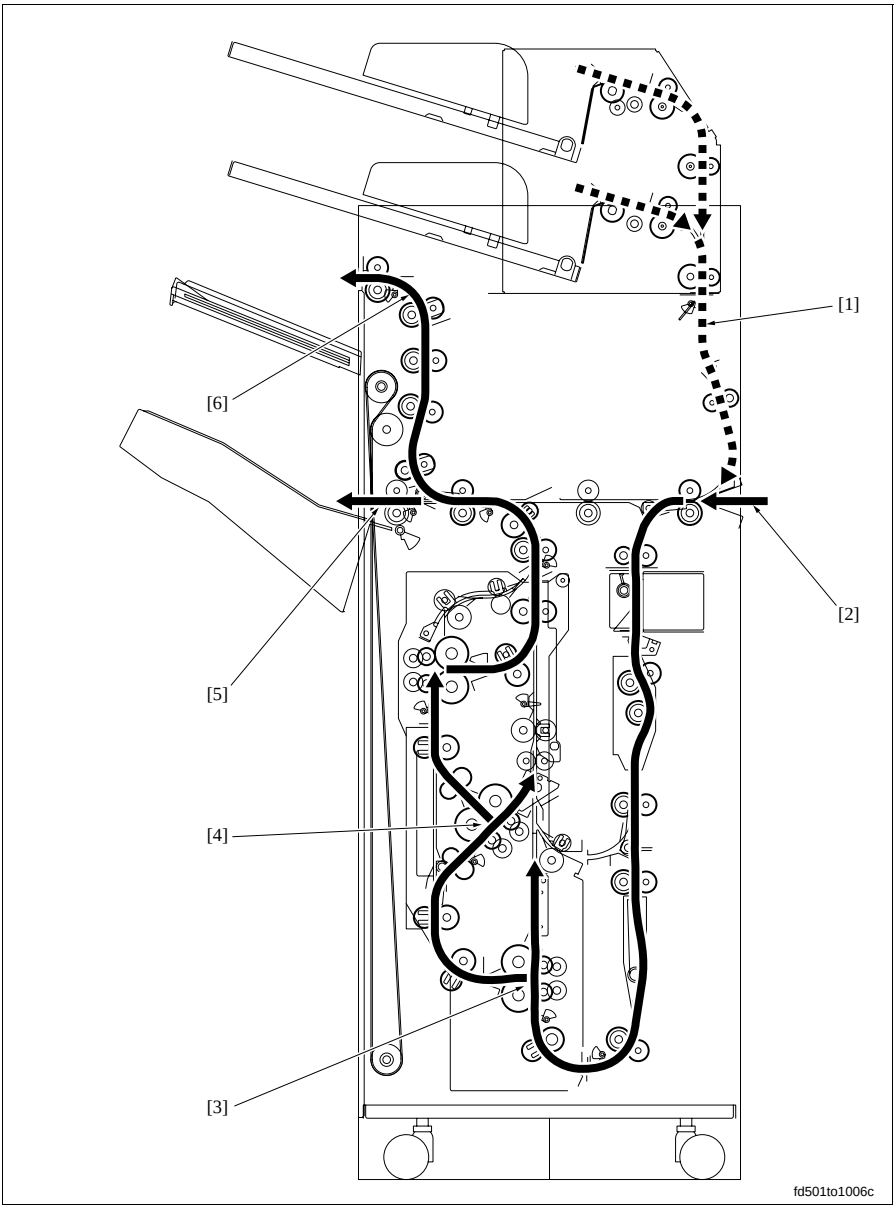
[3] 1st folding

[4] 2nd folding

[5] Paper exit to the main tray, paper through to the next option

[6] Paper exit to the sub tray

E. Letter fold-out mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

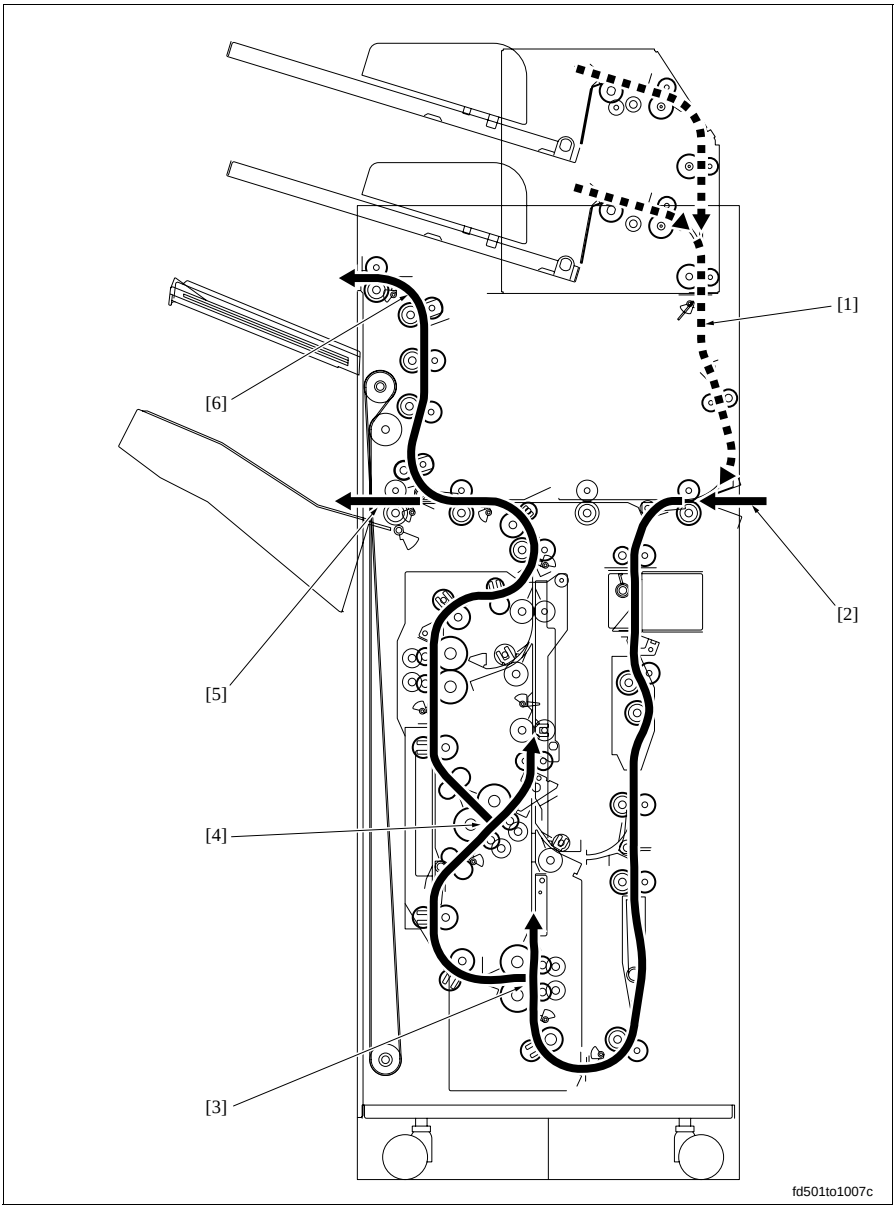
[3] 1st folding

[4] 2nd folding

[5] Paper exit to the main tray, paper through to the next option

[6] Paper exit to the sub tray

F. Letter fold-in/double parallel fold mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

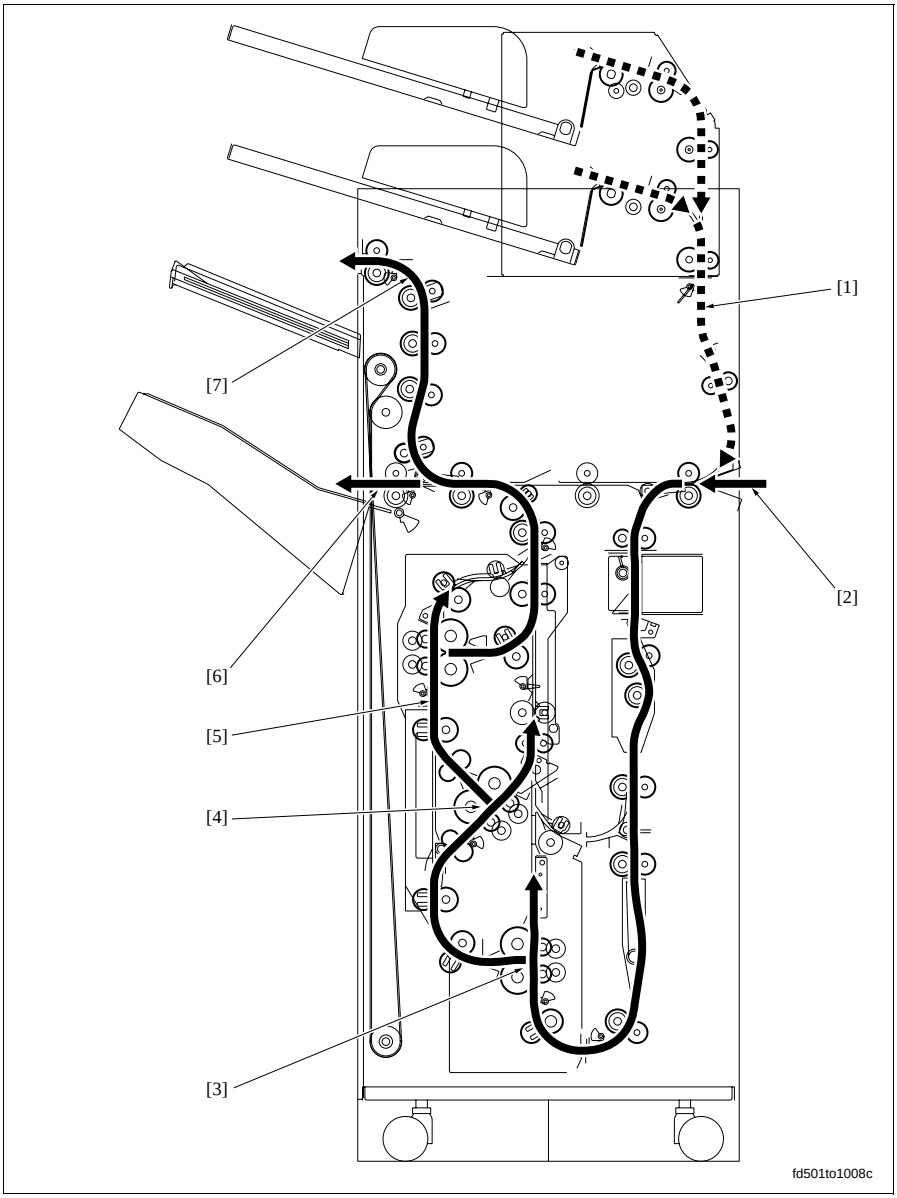
[3] 1st folding

[4] 2nd folding

[5] Paper exit to the main tray, paper through to the next option

[6] Paper exit to the sub tray

G. Gate fold mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

[3] 1st folding

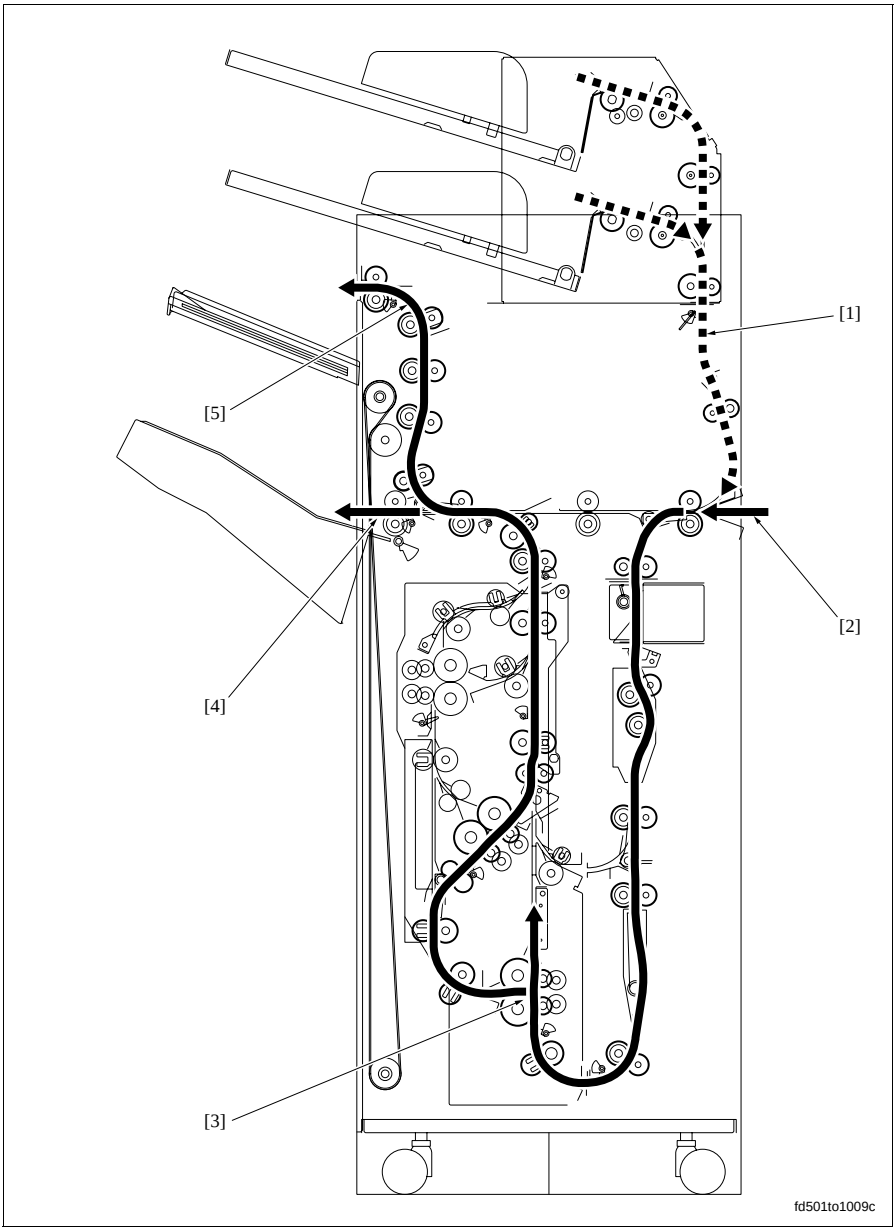
[4] 2nd folding

[5] 3rd folding

[6] Paper exit to the main tray, paper through to the next option

[7] Paper exit to the sub tray

H. Folding mode



[1] Paper through from the PI

[2] Paper through from the main body paper exit

[3] Folding

[4] Paper exit to the main tray, paper through to the next option

[5] Paper exit to the sub tray

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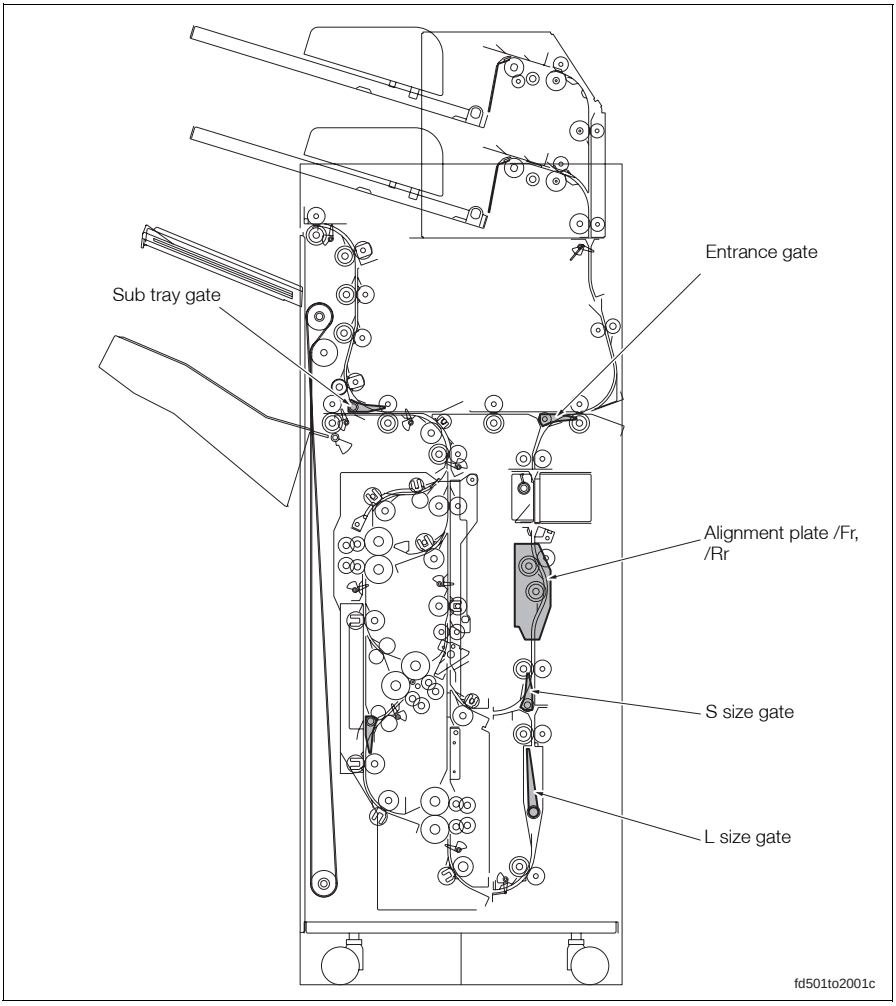
■ COMPOSITION/OPERATION

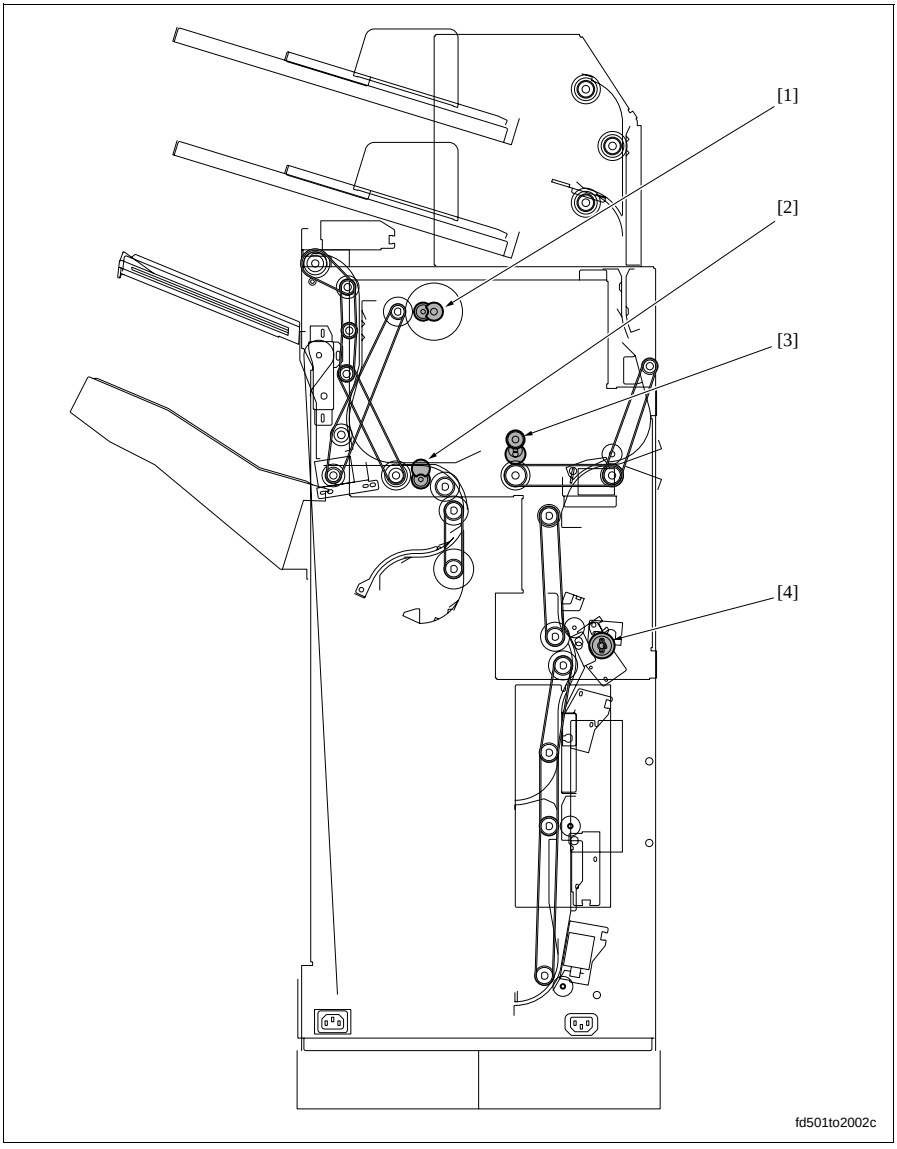
4. CONVEYANCE SECTION

⚠ 4.1 Composition



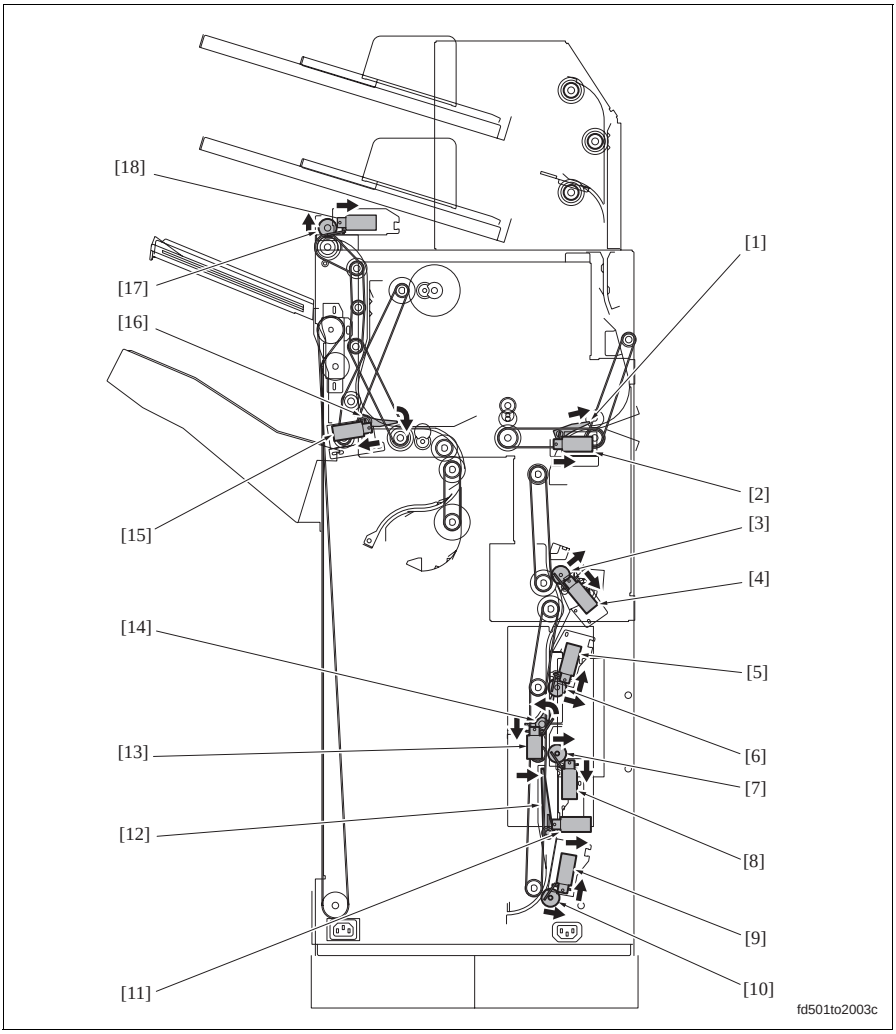
4.2 Drive

4.2.1 Conveyance drive



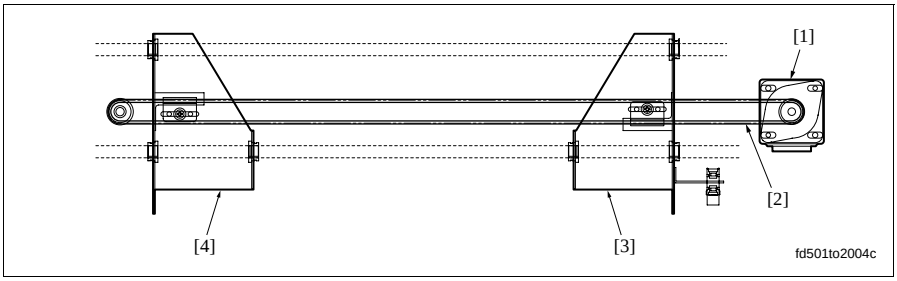
[1] Main tray paper exit motor (M17)
[2] Intermediate conveyance motor (M3)
[3] Entrance conveyance motor (M1)
[4] Punch conveyance motor (M2)

4.2.2 Gate drive



[1] Entrance gate
[2] Entrance gate solenoid (SD1)
[3] Vertical conveyance roller /1
[4] Roller solenoid /1 (SD5)
[5] Roller solenoid /2 (SD6)
[6] Vertical conveyance roller /2
[7] Vertical conveyance roller /3
[8] Roller solenoid /3 (SD7)
[9] Roller solenoid /4 (SD8)
[10] Vertical conveyance roller /4
[11] L size gate solenoid (SD4)
[12] L size gate
[13] S size gate solenoid (SD3)
[14] S size gate
[15] Sub tray gate solenoid (SD9)
[16] Sub tray gate
[17] Sub tray paper exit roller
[18] Paper exit solenoid (SD12)

4.2.3 Alignment drive



[1] Alignment motor (M12)
[2] Belt
[3] Alignment plate /Rr
[4] Alignment plate /Fr

4.3 Operation

4.3.1 Conveyance path switching

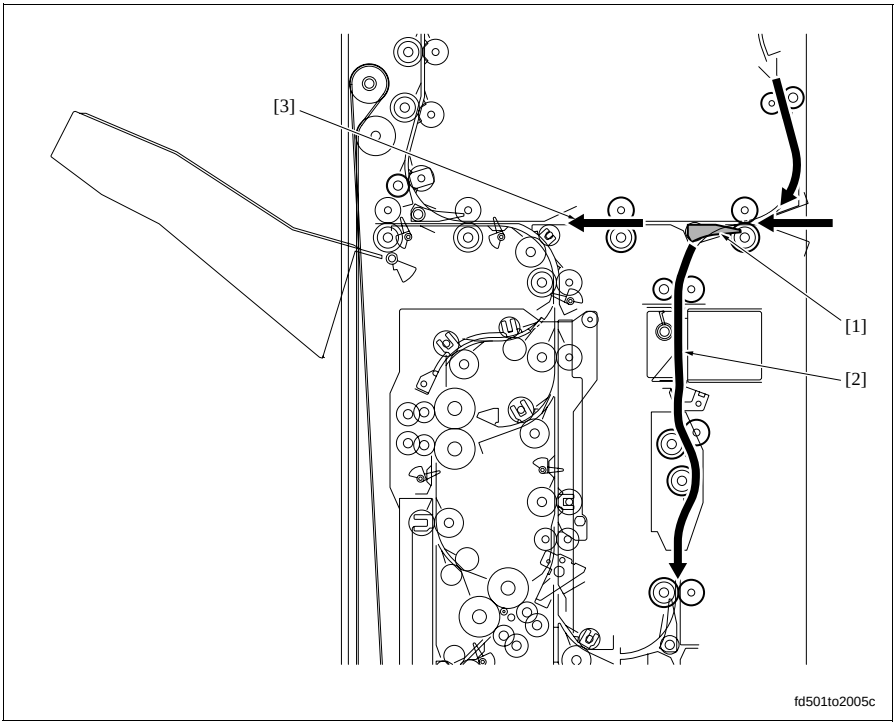
The conveyance path of the paper that has been conveyed to the entrance guide plate varies according to the presence of a punch or folding, the tray into which paper is exited, and the paper size. The switching of the conveyance path is made by the entrance gate, the sub tray gate, the S size gate, the L size gate and the folding gate. (For the folding gate, see "6. FOLDING CONVEYANCE SECTION.")

A. Entrance gate

Switching is made between the straight conveyance and the punch/folding conveyance by the entrance gate solenoid (SD1). In the case of the straight conveyance, the SD1 remains OFF.

When conveying the 1st sheet of paper for punching/folding operation, SD1 is energized a specified period of time after the start button is turned ON.

For the 2nd and the succeeding sheets of paper, SD1 is energized in accord with the conveyance direction of the succeeding page after the preceding page passes through the FD entrance sensor (PS1).



[1] Entrance gate

[2] Punch mode or folding mode

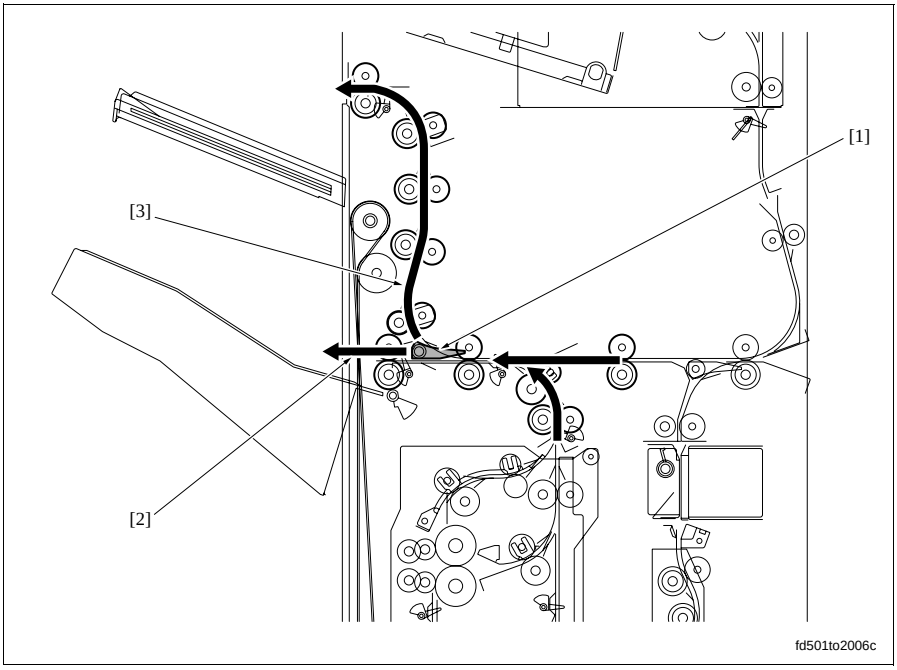
[3] Straight mode

B. Sub tray gate

Switching is made between the main tray paper exit and the sub tray paper exit by the sub tray gate solenoid (SD9). In the case of the main tray paper exit, the SD9 remains OFF.

When exiting the 1st sheet of paper into the sub tray, switch the SD9 a specified period of time after the start button is turned ON.

For the 2nd and the succeeding sheets of paper, SD9 is energized in accord with the paper exit direction of the succeeding page after the preceding page passes through the intermediate conveyance sensor (PS13).



[1] Sub tray gate

[2] Main tray paper exit

[3] Sub tray paper exit

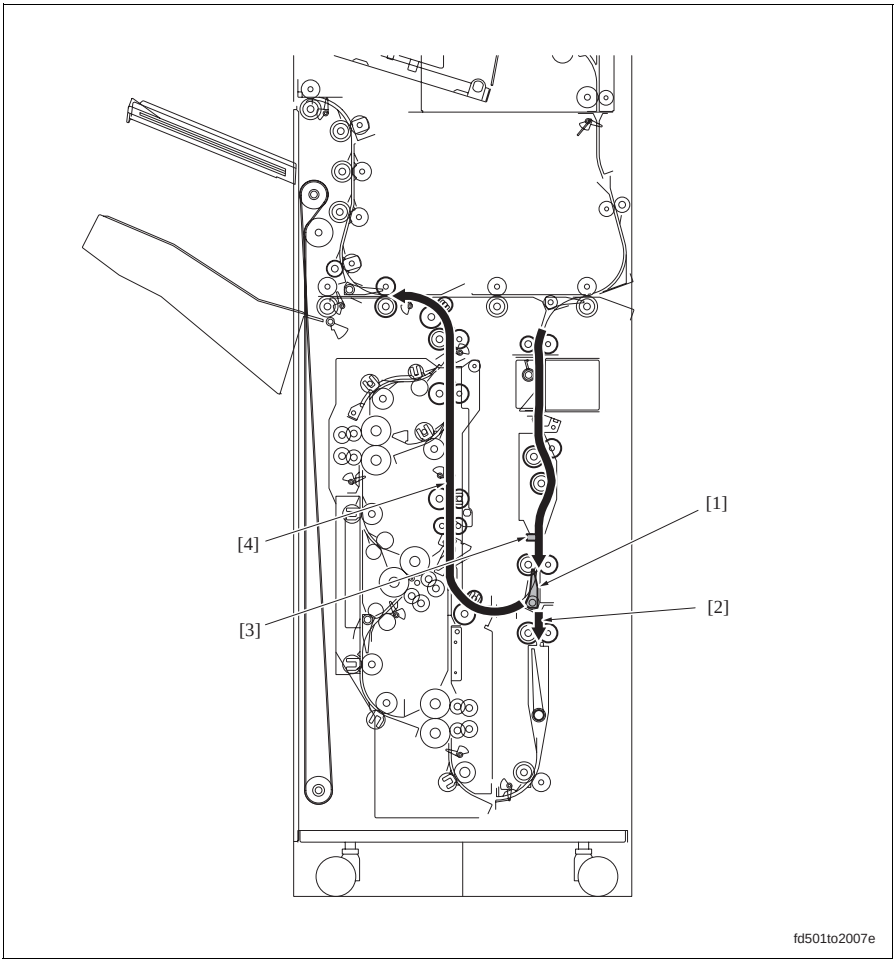
C. S size gate

Switching is made according to the paper size and the presence of folding. The drive of the gate is made by S size gate solenoid (SD3). In the punch mode with no folding and in the case of the S size paper, SD3 remains OFF.

When conducting the folding operation or when feeding the 1st sheet of large size paper, switch SD3 a specified period of time after the start button is turned ON.

For the 2nd and the succeeding sheets of paper, switch the SD9 in accord with the paper exit direction of the succeeding page after the preceding page passes through the punch conveyance sensor (PS5).

S size paper: The length in the sub scan direction is 216 mm or less.



[1] S size gate

[2] In the case of the folding (regardless of the presence of a punch)

[3] Punch conveyance sensor (PS5)

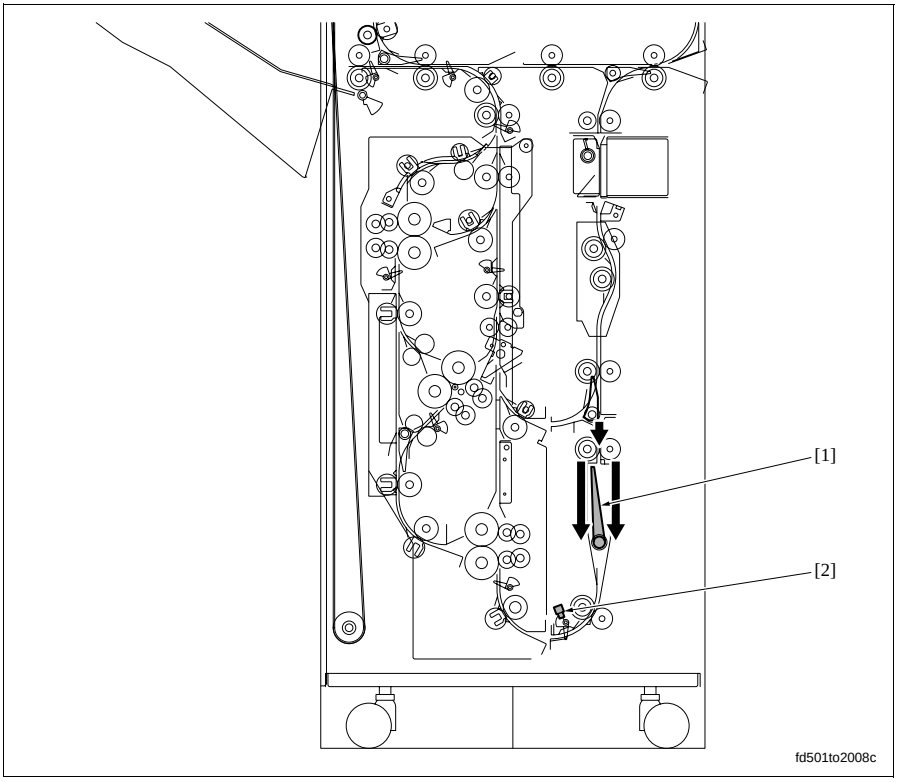
[4] In the case of the S size paper with a punch only

D. L size gate

When folding the paper, the conveyance path is switched back and forth for each paper conveyance to prevent the succeeding paper from coming into contact with the trailing edge of the L size paper that is in folding process.

The drive of the gate is made by the L size gate solenoid (SD4).

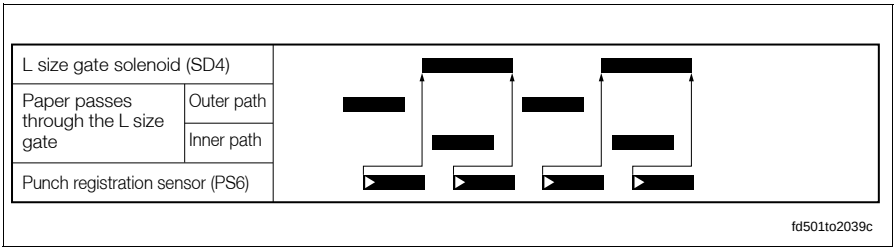
L size paper: The length in the sub scan direction is 216 mm or more.



[1] L size gate (SD4-OFF position)

[2] Punch registration sensor (PS6)

For the control of the L size gate, SD4 stands by at the OFF position (outer path) for the 1st sheet of paper to pass through.
The 1st sheet of paper turns ON SD4 a specified period of time after the punch registration sensor (PS6) turns ON, and makes the switch to the inner path.
When the 2nd sheet of paper turns ON PS6, SD4 turns OFF after a specified period of time to make the switch to the outer path.
The above operations are repeated for each sheet of paper.



4.3.2 Conveyance line speed control

The conveyance line speed of each conveyance section varies according to the type of paper and paper weight.

A. Line speed switching

The following list shows each of conveyance sections and the range of the conveyance line speed.

Conveyance section	Conveyance line speed
Entrance conveyance section	290 to 1000 mm/s
Intermediate conveyance section	800 to 1000 mm/s
Punch conveyance section	490 to 1000 mm/s
Main tray paper exit section	205 to 1000 mm/s
Sub tray paper exit section	500 mm/s

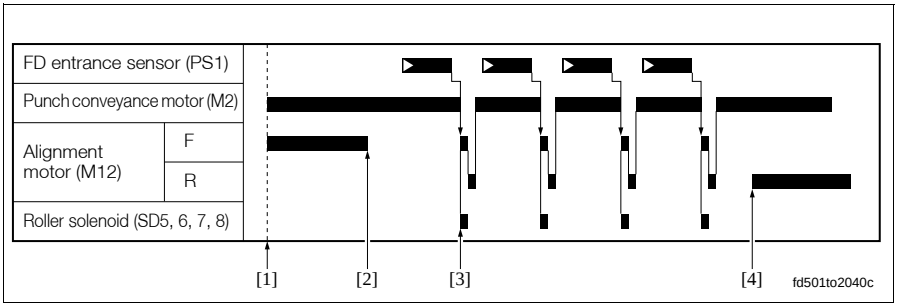
4.3.3 Alignment control

On paper conveyed to the punching position, an alignment operation is made by the 2 alignment plates to improve the accuracy of the punch hole positioning and the folding. And its home position is detected by the alignment plate home sensor (PS10). When the start button is turned ON, M12 rotates in the forward direction to move the alignment plates /Fr and /Rr to the standby position of the paper size.

When the paper is conveyed to the punch position in a specified number of steps after it passes through the FD entrance sensor (PS1), the roller solenoid /1 (SD5), the roller solenoid /2 (SD6), the roller solenoid /3 (SD7) and the roller solenoid /4 (SD8) release the pressure of each roller and M12 conducts the alignment operation.

The roller solenoids that release each of the rollers from pressure are modified according to the size and the direction of paper aligned.

A specified period of time after completion of punching the last paper, M12 rotates in the reverse direction to bring the alignment plate back to the home position.



[1] Start signal ON

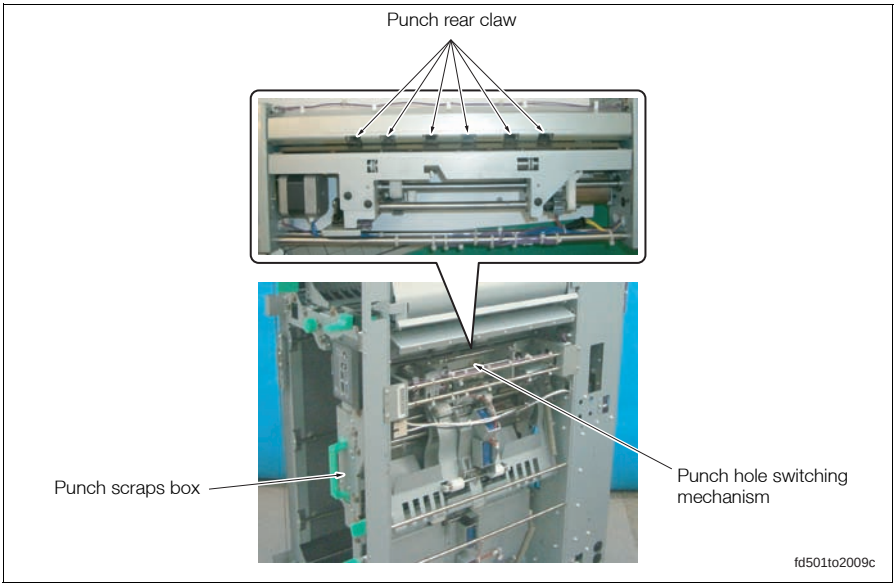
[2] Move to the standby position

[3] Alignment operation

[4] Move to the home position

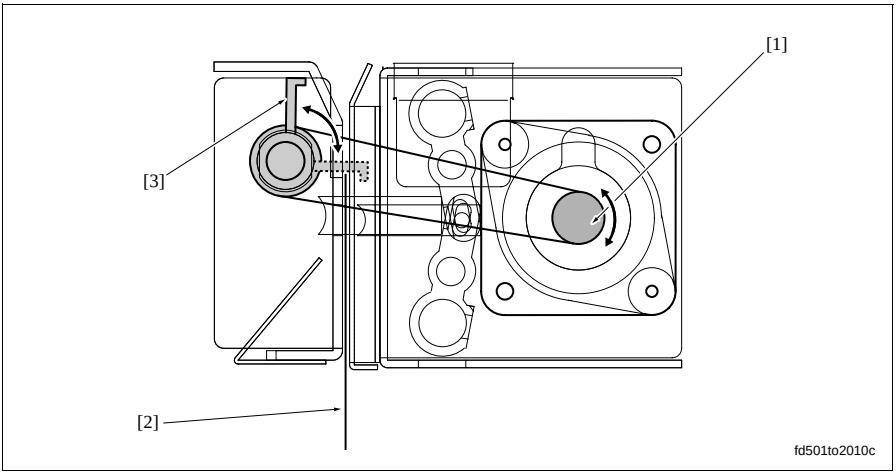
5. PUNCH SECTION

⚠ 5.1 Composition



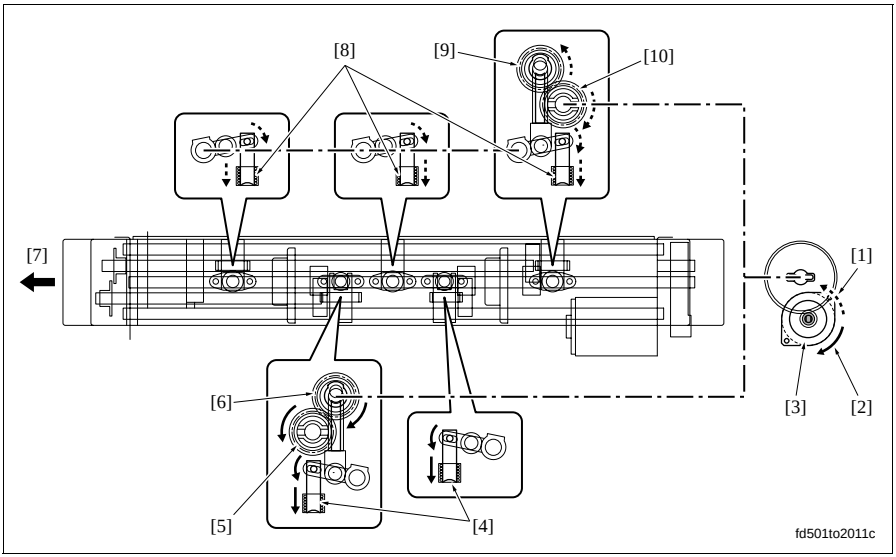
5.2 Drive

5.2.1 Rear registration drive



[1] Punch registration motor (M13)
[2] Paper
[3] Punch rear claw

5.2.2 Punch drive



[1] Rotation when punching 3 holes (as seen from the front)
[2] Rotation when punching 2 holes (as seen from the front)
[3] Punch motor (M10)
[4] 2-hole punch edge
[5] One-way gear (2-hole punch)
[6] Eccentric cam
[7] Front direction
[8] 3-hole punch edge
[9] Eccentric cam
[10] One-way gear (3-hole punch)

5.3 Operation

A. Punch control

Punching is made by holding down the trailing edge of paper with the punch rear claw that is driven by the punch registration motor (M13), while driving the eccentric cam by the punch motor (M10).
After alignment operations, the roller solenoids /1 to /4 are turned ON to let paper be placed in the unfixed condition. The paper, however, is held by the curvature of the conveyance section. And then, the punch registration motor (M13) rotates a specified number of steps and the punch rear claw holds the trailing edge of paper to move it to the punching position. After a specified period of time, the punch motor (M10) drives for punching. After completion of punching, M13 returns the punch rear claw to the home position. The position of the home position is detected by the punch registration home sensor (PS11).

B. Punch hole switching control

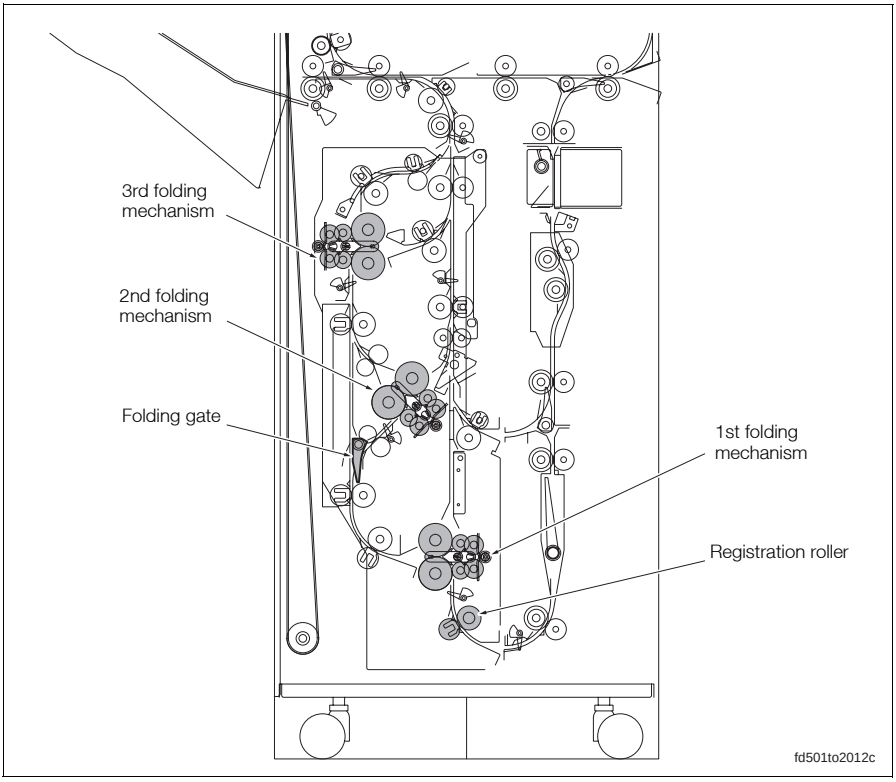
The punch hole is switched according to the rotational direction of the punch motor (M10).
In the case of 2 holes, M10 rotates counterclockwise to drive the 2-hole punch edge. And in the case of 3 holes, M10 rotates clockwise to drive the 3-hole punch edge.
The position of the 2-hole punch edge is detected by the 2-hole punch home sensor (PS8) and the position of the 3-hole punch edge is detected by the 3-hole/4-hole punch home sensor (PS9).

C. Punch scraps box control

The setting of the punch scraps box is detected by the punch scraps box set sensor (PS12), and the full condition of the punch scraps box is detected by the punch scraps full sensor (PS26).

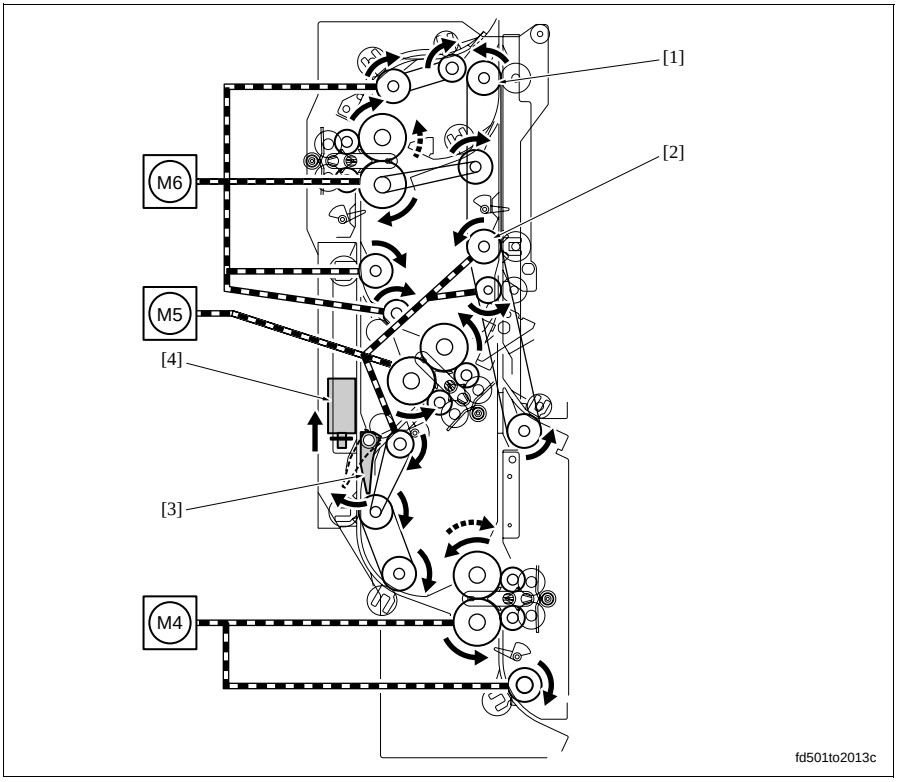
6. FOLDING CONVEYANCE SECTION

⚠ 6.1 Composition



6.2 Drive

6.2.1 Conveyance drive



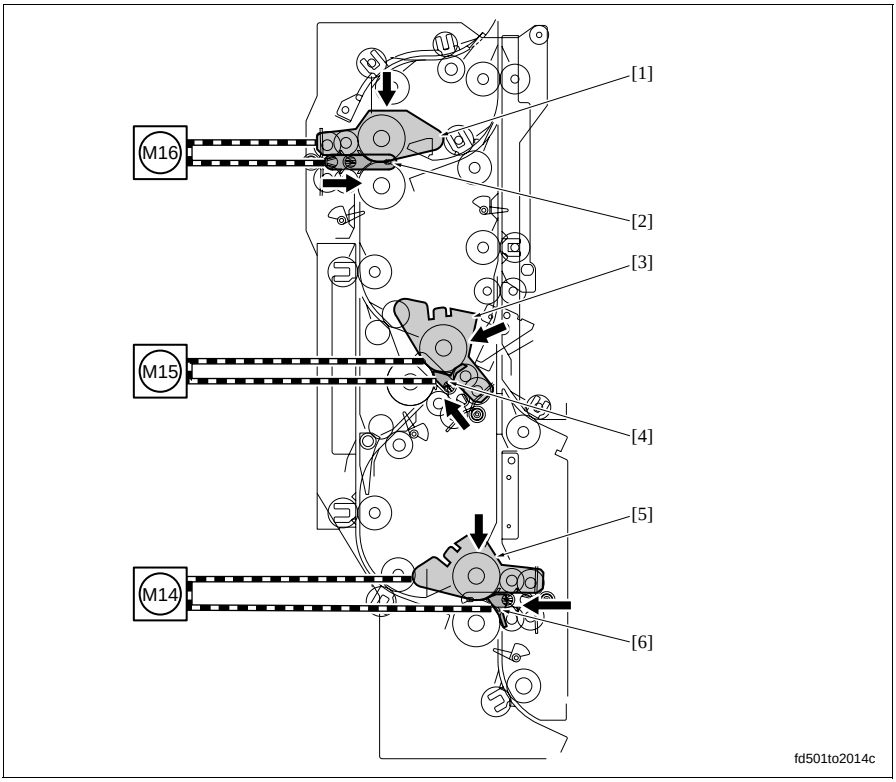
[1] Coupling

[2] The pulley operates as an idler due to the bearing

[3] Folding gate

[4] Folding gate solenoid (SD15)

6.2.2 Folding drive



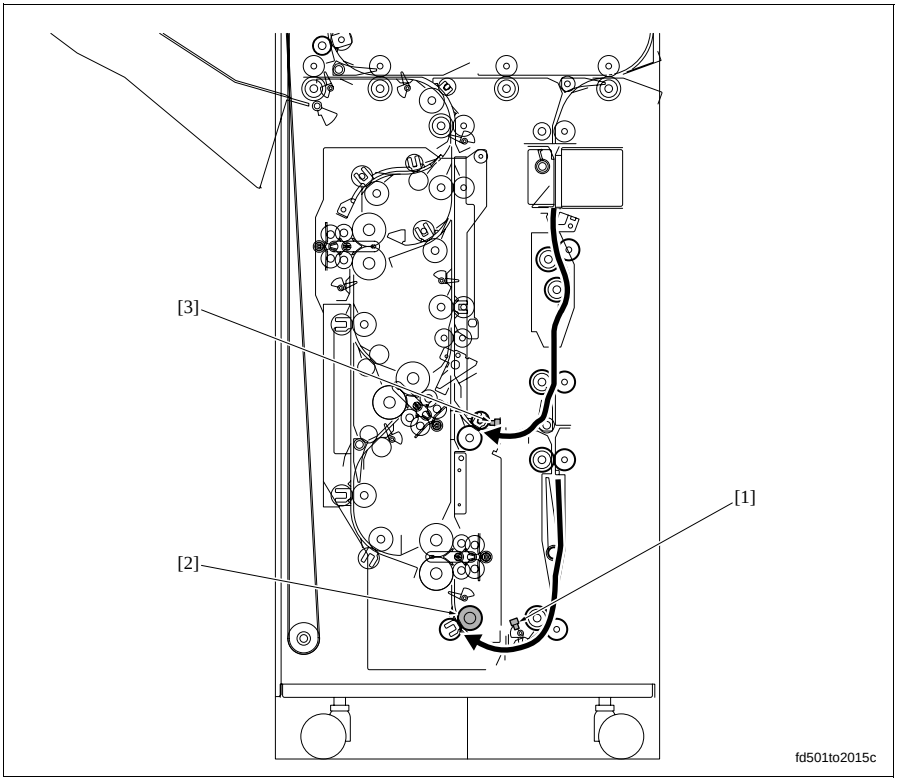
[1] 3rd folding roller /1 mounting board
[2] 3rd folding guide
[3] 2nd folding roller /1 mounting board
[4] 2nd folding guide
[5] 1st folding roller /1 mounting board
[6] 1st folding guide

6.3 Operation

6.3.1 Registration control

The paper that has passes through the punch registration sensor (PS6) and arrives at the folding conveyance section is pressed against the registration roller to make adjustments for skew. A specified period of time after the PS6 turns ON, the 1st folding motor (M4) resumes the conveyance of paper. When no folding operation is made, no registration control is made.

However, no folding is made on the paper that has entered the folding conveyance section from the folding entrance sensor side. The paper is conveyed vertically as is and exited to the main tray or the sub tray.



[1] Punch registration sensor (PS6)

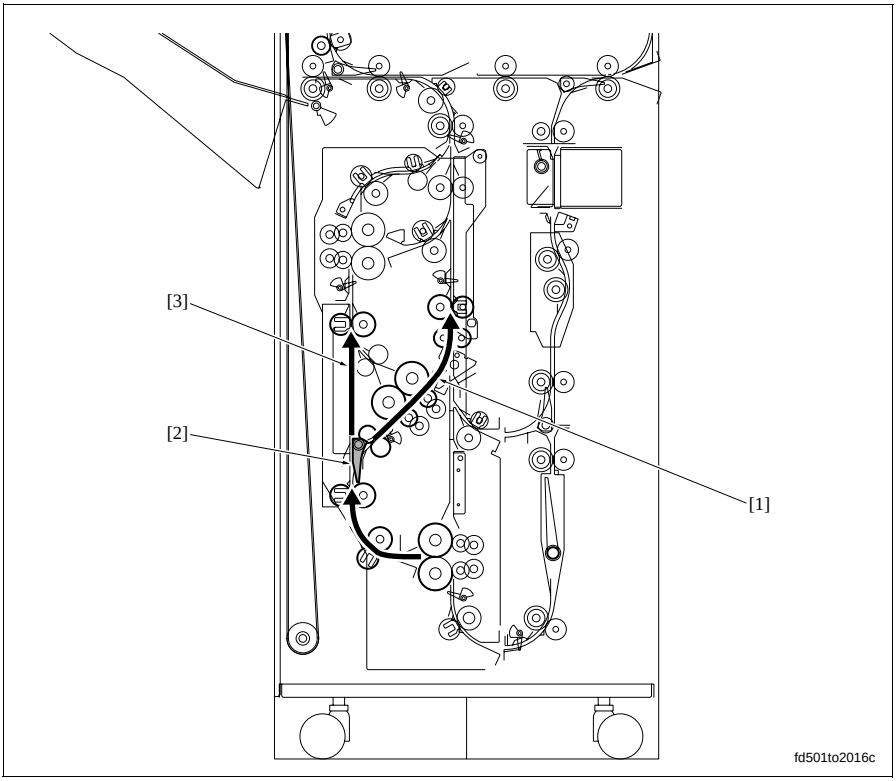
[2] Registration roller

[3] Folding entrance sensor (PS52)

6.3.2 Conveyance path switching

Switching is made between the 2nd folding conveyance path and the 3rd folding conveyance path by the folding gate solenoid (SD15).

In the case of other than the Z-fold, a specified period of time after the 1st folding conveyance sensor (PS51) turns ON, SD15 turns ON to convey the paper to the 2nd folding after the 1st folding. In the case of the Z-fold, SD15 remains OFF and the paper is conveyed to the 3rd folding after the 1st folding.

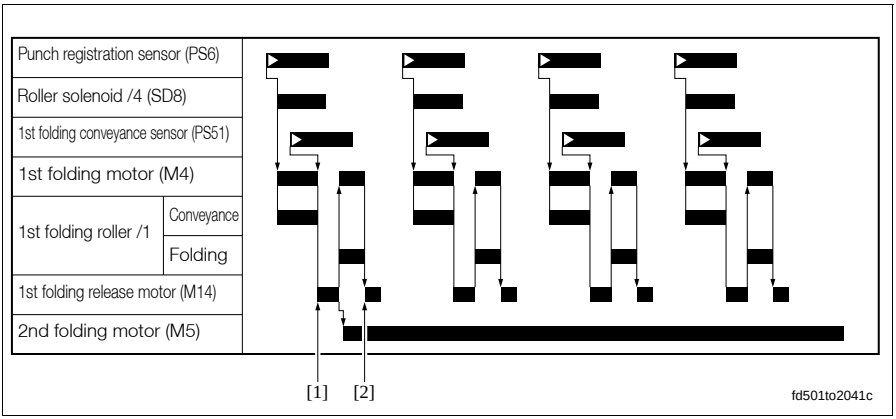


[1] In the case of other than the Z-fold

[2] Folding gate

[3] In the case of the Z-fold

Timing chart of the 1st folding roller /1 (Other folding rollers are also controlled in the same manner.)



[1] Change of the 1st folding roller /1 to the folding position

[2] Change of the 1st folding roller /1 to the conveyance position

6.3.3 1st folding control

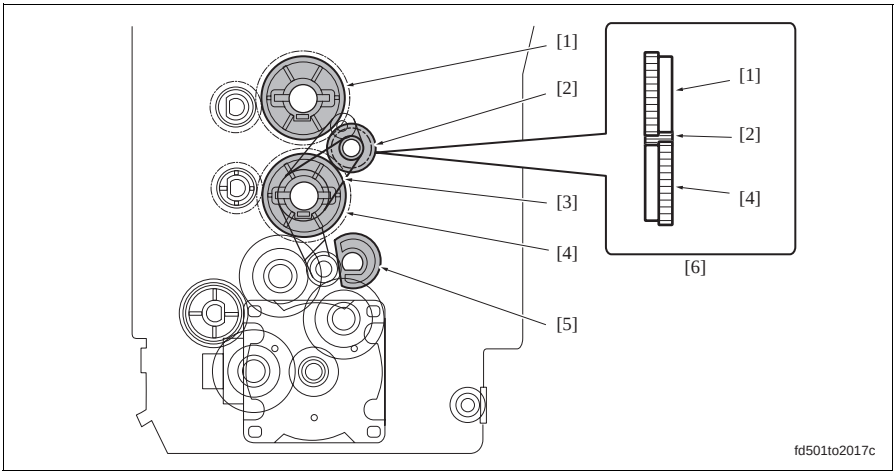
⚠ **A. Conveyance/folding switching control**

The switching between conveyance and folding is made by moving the 1st folding roller /1. This switching is made when the eccentric cam is driven by the 1st folding release motor (M14).

After the 1st folding conveyance sensor (PS51) turns ON, the paper is conveyed by a specified number of steps. While the paper is being conveyed, the 1st folding roller gears /1 [1] and /2 [4] rotate in the same direction since these 2 gears are interlocked each other through the idle gear [2].

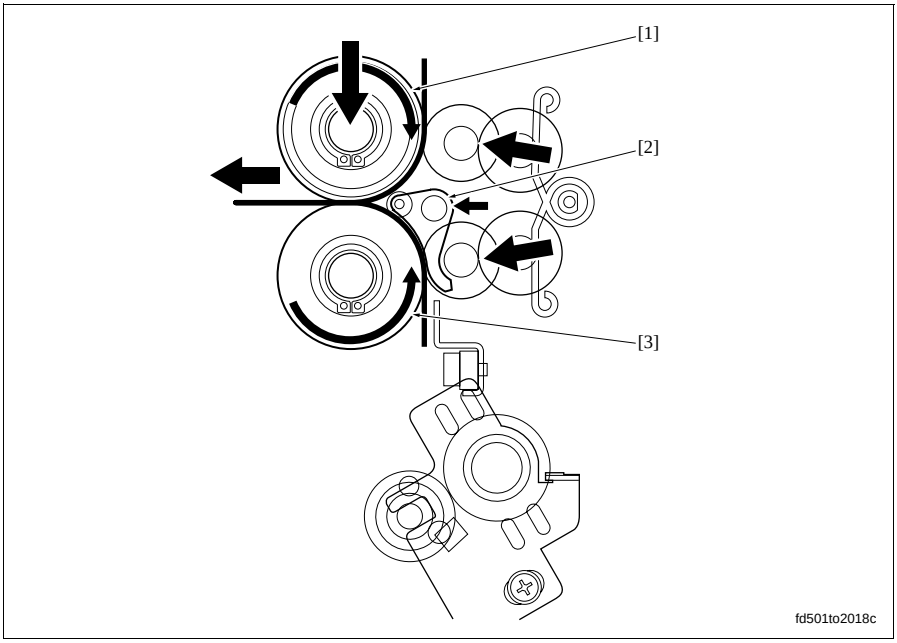
After conveying the paper by the prescribed number of steps, M14 rotates until it gets to a specified number of steps. This rotates the eccentric cam [5] to allow the idle gear arm [3] to separate the idle gear [2] from the 1st folding roller gears /1 [1] and /2 [4]. At the same time, when M14 starts up, the cam provided on the inside of the 1st roller gear /2 [4] rotates to allow the 1st roller /1 and 1st roller /2 to contact each other closely to rotate 1st roller /1. get the gears engaged.

The phases of the 1st folding roller gears /1 [1] and the 1st folding roller gears /2 [3] are not aligned in the depth direction. Therefore, they do not engage with each other after the idle gear [2] has been separated.



[1] 1st folding roller gear /1
[2] Idle gear
[3] Idle gear arm
[4] 1st folding roller gear /2
[5] Eccentric cam
[6] Seen from the FD side

And in parallel with this, when the 1st folding release motor (M14) starts up, the winding-up of the wire that pulls the folding guide [2] to the right side is loosened to allow the folding guide [2] to push out the paper in the clearance between the 1st folding rollers /1 [1] and /2 [3]. As a result, the paper gets caught in the rollers to be folded.



[1] 1st folding roller /1

[2] Folding guide

[3] 1st folding roller /2

6.3.4 2nd folding control

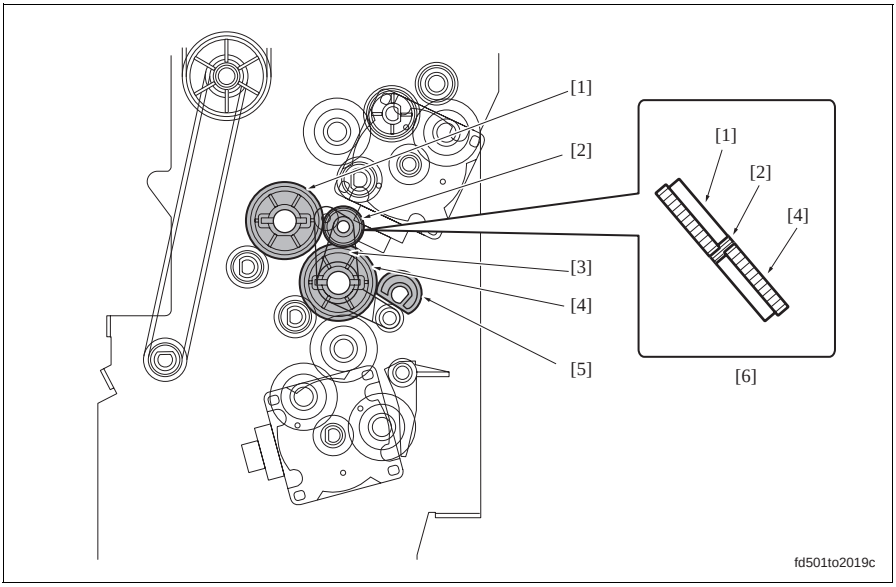
⚠ **A. Conveyance/folding switching control**

The switching between conveyance and folding is made by moving the 2nd folding roller /1. This switching is made when the eccentric cam is driven by the 2nd folding release motor (M15).

After the 2nd folding conveyance sensor (PS53) turns ON, the paper is conveyed by a specified number of steps. While the paper is being conveyed, the 2nd folding roller gears /1 [1] and /2 [4] rotate in the same direction since these 2 gears are interlocked each other through the idle gear [2].

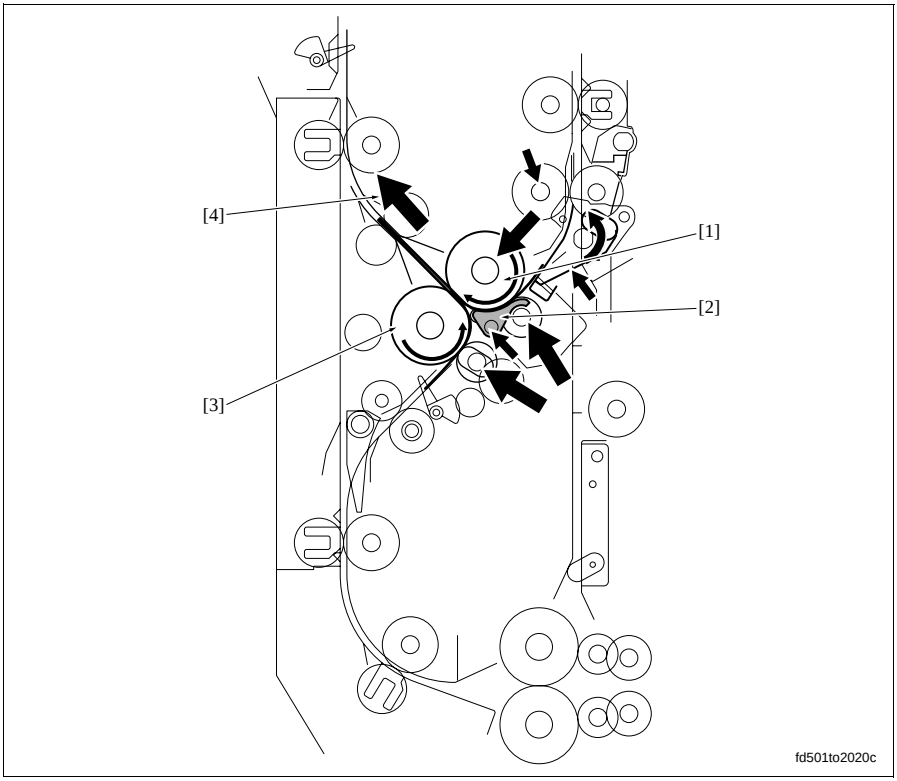
After conveying the paper by the prescribed number of steps, M15 rotates until it gets to a specified number of steps. This rotates the eccentric cam [5] to allow the idle gear arm [3] to separate the idle gear [2] from the 2nd folding roller gears /1 [1] and /2 [4]. At the same time, when M14 starts up, the cam provided on the inside of the 2nd roller gear /2 [4] rotates to allow the 2nd roller /1 [1] and 2nd roller /2 to contact each other closely to rotate the 2nd roller /1.

The phases of the 2nd folding roller gears /1 [1] and the 2nd folding roller gears /2 [3] are not aligned in the depth direction. Therefore, they do not engage with each other after the idle gear [2] has been separated.



[1] 2nd folding roller gear /1
[2] Idle gear
[3] Idle gear arm
[4] 2nd folding roller gear /2
[5] Eccentric cam
[6] Seen from the FD side

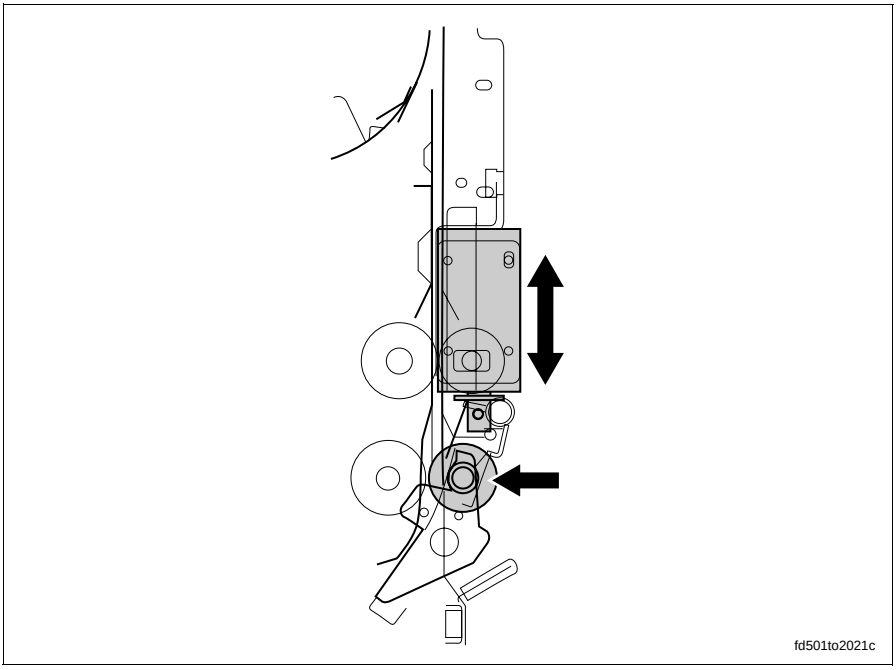
And in parallel with this, when the 2nd folding release motor (M15) starts up, the winding-up of the wire that pulls the folding guide [2] to the right side is loosened to allow the folding guide [2] to push out the paper in the clearance between the 2nd folding rollers /1 [1] and /2 [3]. As a result, the paper gets caught in the rollers to be folded.



[1] 2nd folding roller /1
[2] Folding guide
[3] 2nd folding roller /2
[4] Direction of paper exit

B. Gate fold assist control

In the case of the Gate fold, the 2nd folding roller solenoid (SD18) turns ON a specified period of time after the 1st folding motor (M14) starts folding. When SD18 starts up, the 2nd roller is pressed firmly. This is a measure taken to avoid a multiple fold that is apt to occur at the folding section of paper when the 2nd folding is made.



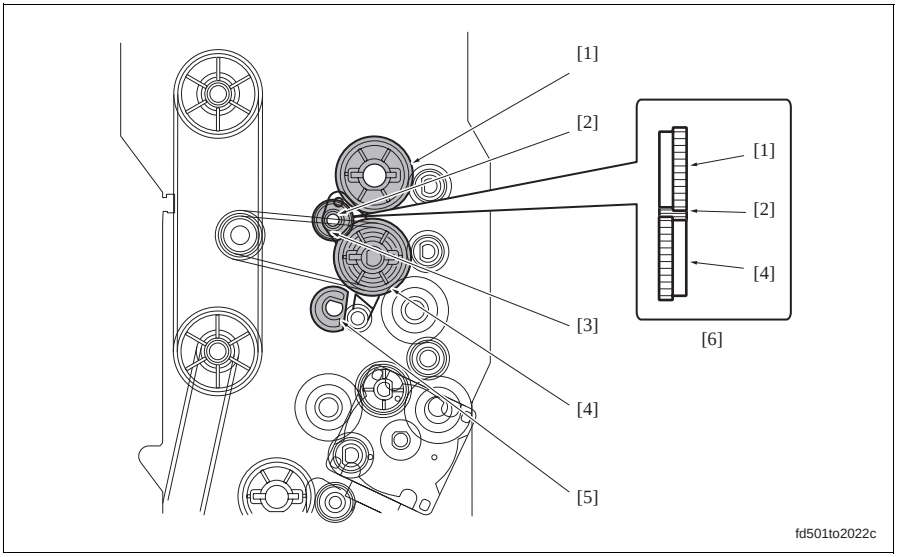
6.3.5 3rd folding control

⚠ **A. Conveyance/folding switching control**

The switching between conveyance and folding is made by moving the 3rd folding roller /1. This switching is made when the eccentric cam is driven by the 3rd folding release motor (M16).

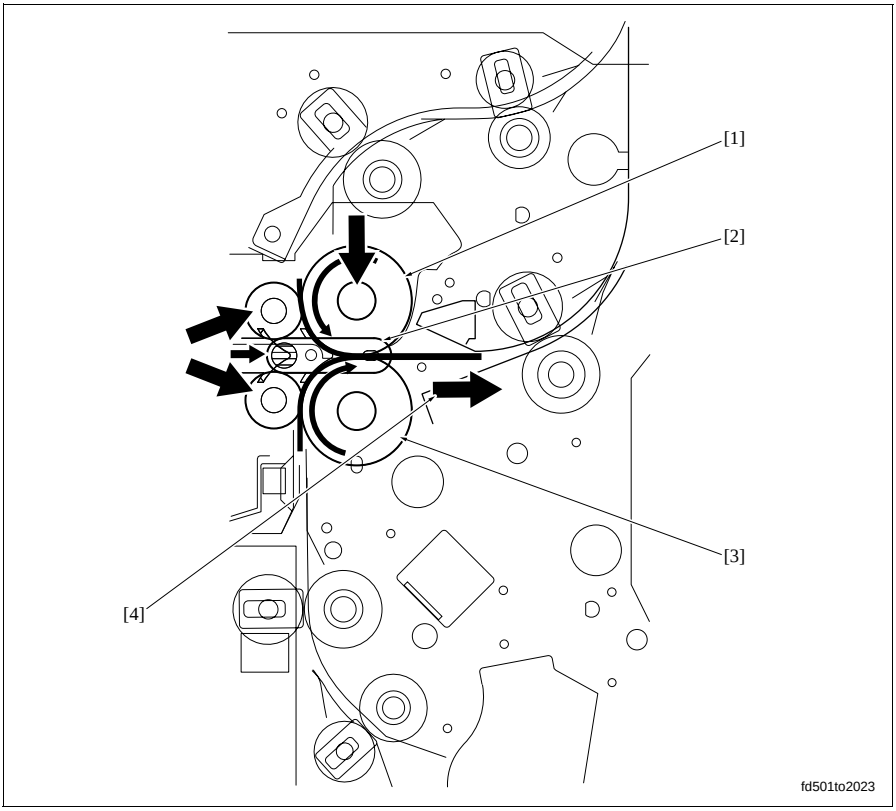
After the 3rd folding conveyance sensor (PS54) turns ON, the paper is conveyed by a specified number of steps. While the paper is being conveyed, the 3rd folding roller gears /1 [1] and /2 [4] rotate in the same direction since these 2 gears are interlocked each other through the idle gear [2].

After conveying the paper by the prescribed number of steps, M16 rotates until it gets to a specified number of steps. This rotates the eccentric cam [5] to allow the idle gear arm [3] to separate the idle gear [2] from the 3rd folding roller gears /1 [1] and /2 [4]. At the same time, when M16 starts up, the cam provided on the inside of the 3rd roller gear /2 [4] rotates to allow the 3rd roller /1 [1] and 3rd roller /2 to contact each other closely to rotate the 3rd roller /1. The plases of the 3rd folding roller gears /1 [1] and the 3rd folding roller gears /2 [3] are not aligned in the depth direction. Therefore, they do not engage with each other the idle gear [2] has been separated.



[1] 3rd folding roller gear /1
[2] Idle gear
[3] Idle gear arm
[4] 3rd folding roller gear /2
[5] Eccentric cam
[6] Seen from the FD side

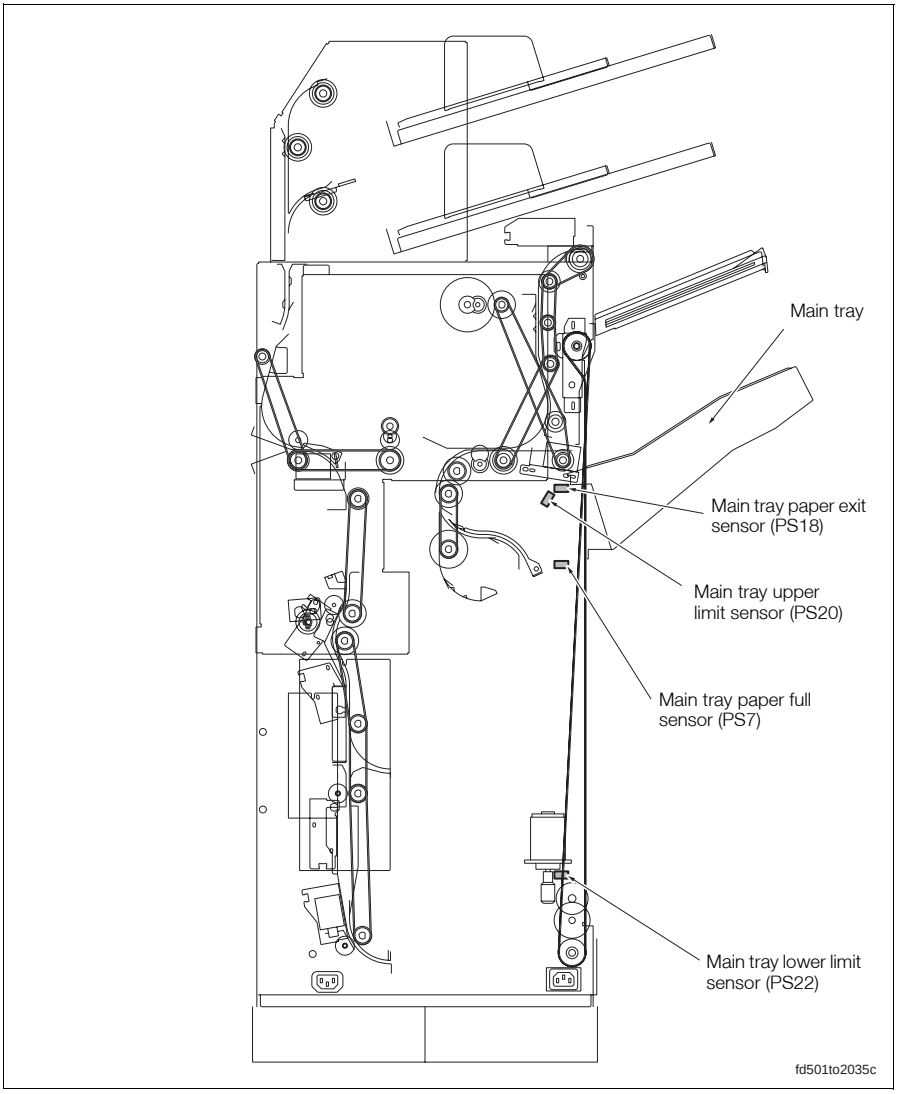
And in parallel with this, when the 3rd folding release motor (M16) starts up, the winding-up of the wire that pulls the folding guide [2] to the left side is loosened to allow the folding guide [2] to push out the paper in the clearance between the 3rd folding rollers /1 [1] and /2 [3]. As a result, the paper gets caught in the rollers to be folded.



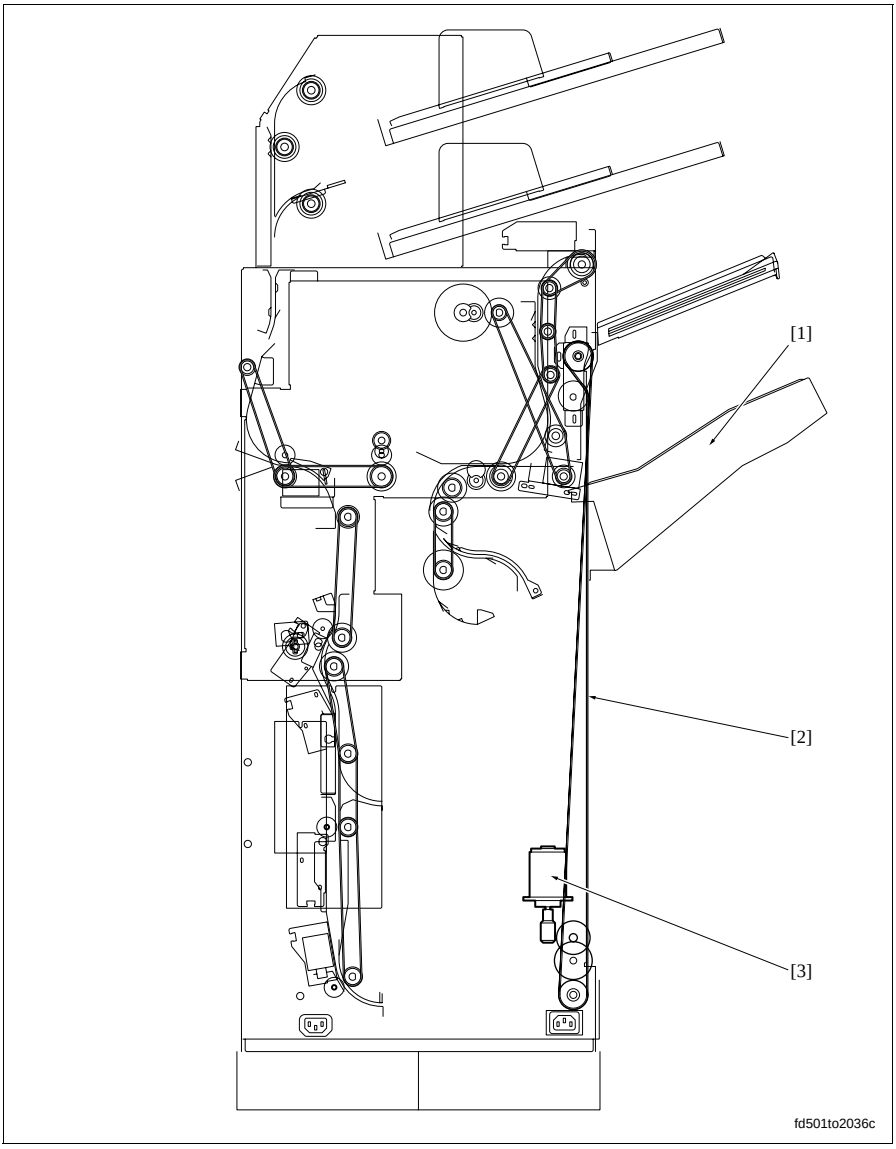
[1] 3rd folding roller /1
[2] Folding guide
[3] 3rd folding roller /2
[4] Direction of paper exit

7. MAIN TRAY SECTION

⚠ 7.1 Composition


Main tray
Main tray paper exit sensor (PS18)
Main tray upper limit sensor (PS20)
Main tray paper full sensor (PS7)
Main tray lower limit sensor (PS22)
fd501to2035c

7.2 Drive



[1] Main tray
[2] Up/down wire
[3] Tray up/down motor (M11)

7.3 Operation

7.3.1 Main tray up/down control

The up/down operation of the main tray is controlled by rotating the tray up/down motor (M11) in the normal or reverse direction.

A. Main tray paper detection

A specified period of time after the main tray paper exit sensor (PS18) turns ON, M11 starts up to bring down the main tray until the main tray upper limit sensor (PS20) turns OFF, and then bring it up again until PS20 turns ON.

After the paper is exited, PS20 maintains the distance between the upper surface of the paper exited in the main tray (the surface of the main tray when no paper exited) and the paper exit opening at a fixed distance to prevent the paper exited from having an uneven edge.

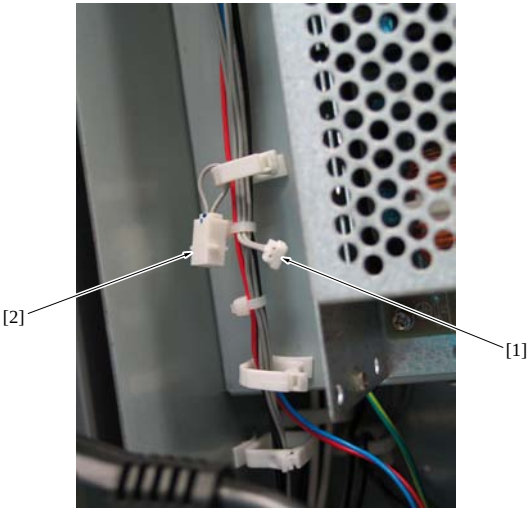
B. Switching the operation of the main tray

The main tray is set so that it normally does not operate.

When letting the main tray operate, insert the short connector [2] into the CN90 [1].

⚠Caution:

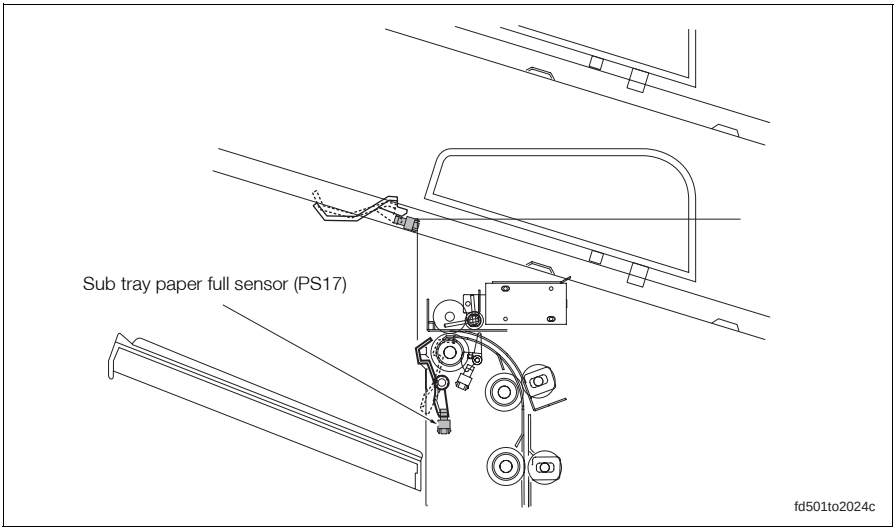
- **Letting the main tray operate with the next option connected may cause damages to the machine. Be absolutely sure not to connect the short connector.**



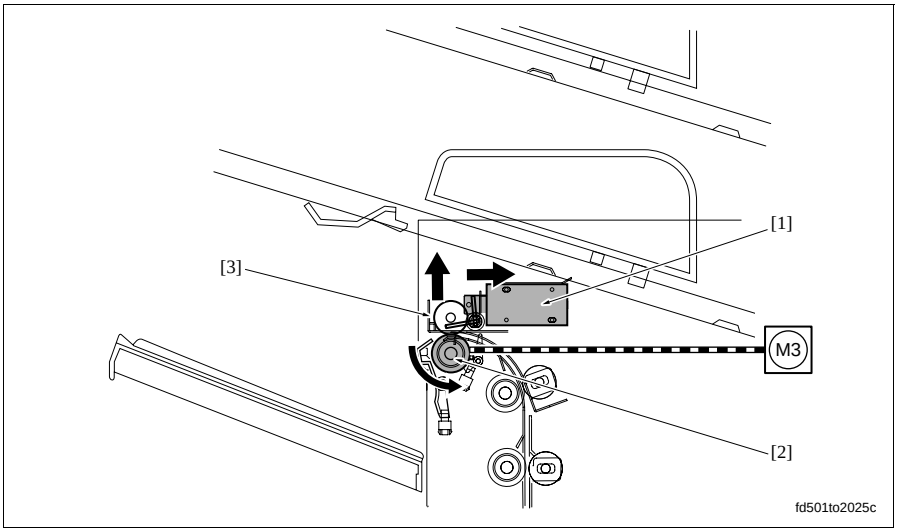
fd501to2037c

8. SUB TRAY SECTION

⚠ 8.1 Composition



8.2 Drive



[1] Paper exit solenoid (SD12)

[2] Sub tray paper exit roller

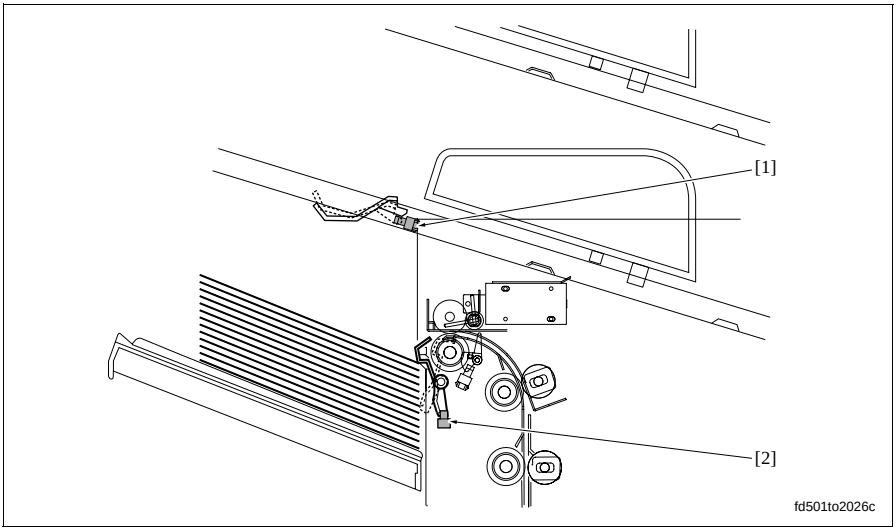
[3] Sub tray paper exit roller

8.3 Operation

8.3.1 Sub tray full detection control

When the paper that has been exited in the sub tray gets to a specified thickness, the sub tray paper full sensor (PS17) [2] turns OFF, and the "sub tray paper full" information is sent to the main body. Upon receipt of this information, the main body displays the message on the operation LCD.

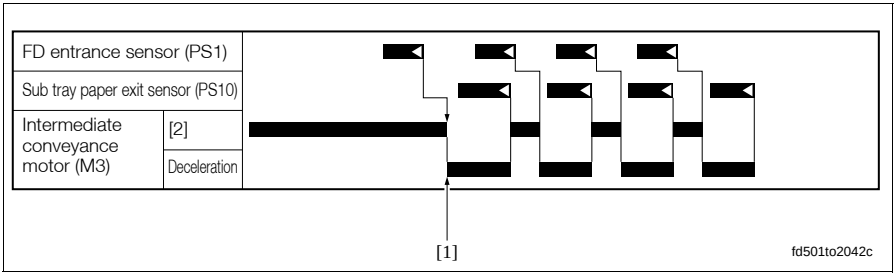
When the folded paper on the sub tray is unfolded and the sub tray paper full sensor (PS46) [1] turns ON, the "sub tray paper full" information is also sent to the main body.



[1] Sub tray folding paper full sensor (PS46) [2] Sub tray paper full sensor (PS17)

8.3.2 Line speed switching

Paper conveyed by the intermediate conveyance motor (M3) is decelerated for each sheet of paper to be exited into the sub tray.

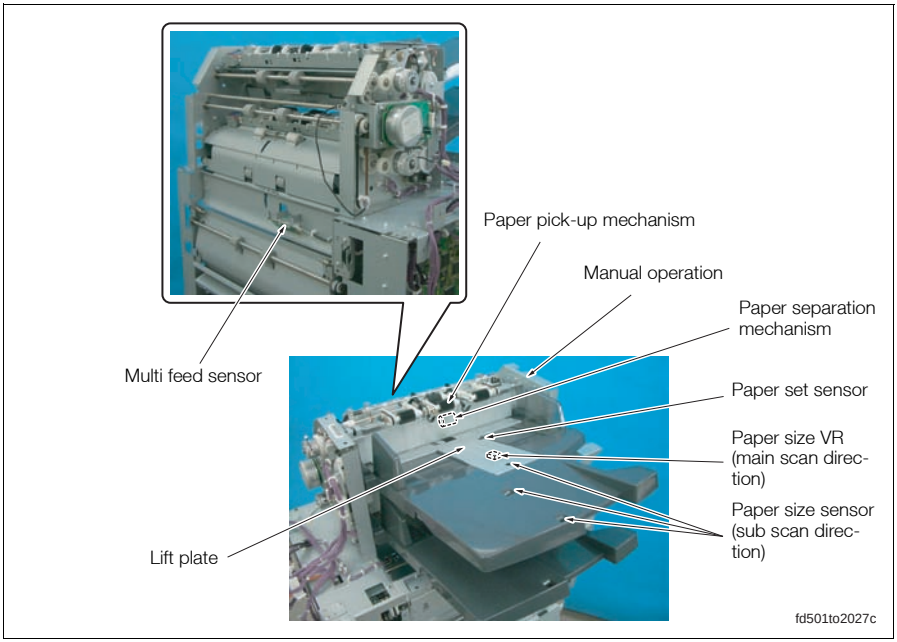


[1] Deceleration of the intermediate conveyance motor (M3) [2] High speed rotation

* The time period up to the deceleration can be changed by the system speed on the main body side.

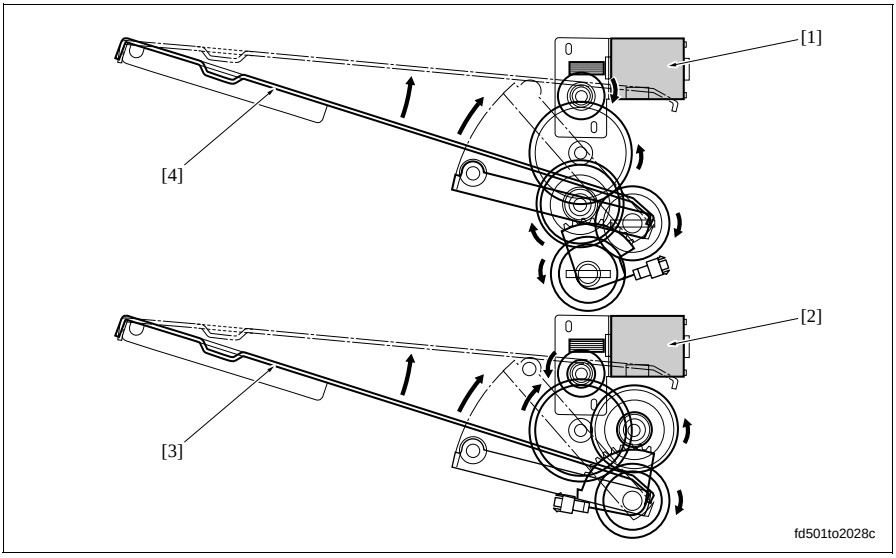
9. PI SECTION

⚠ 9.1 Composition



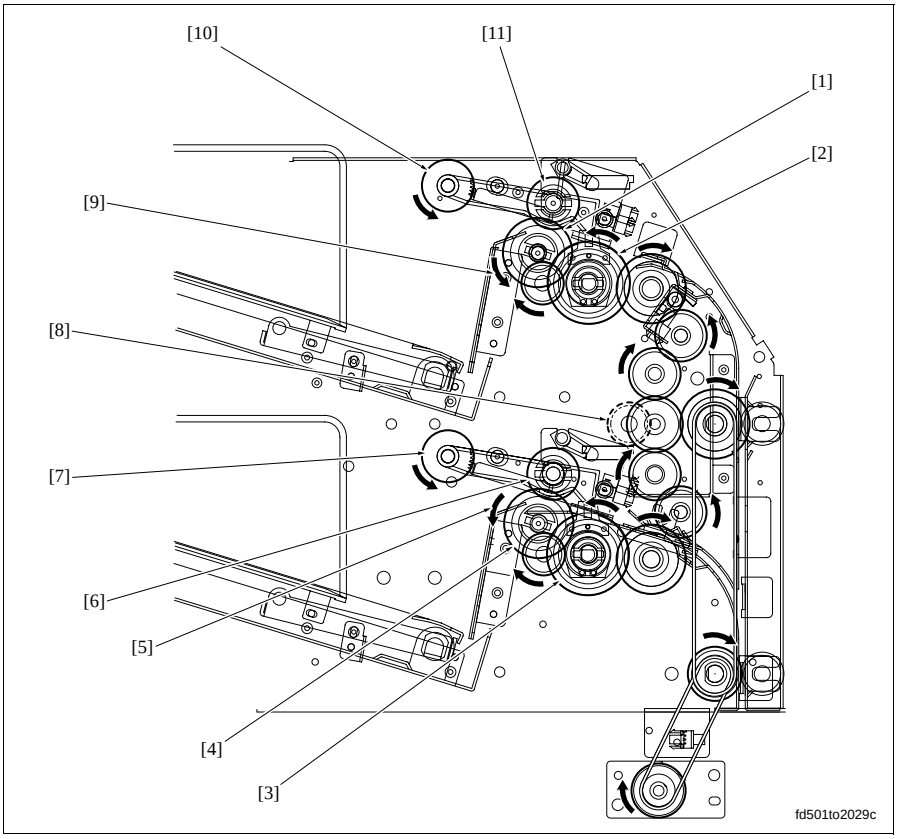
9.2 Drive

9.2.1 Tray lift drive



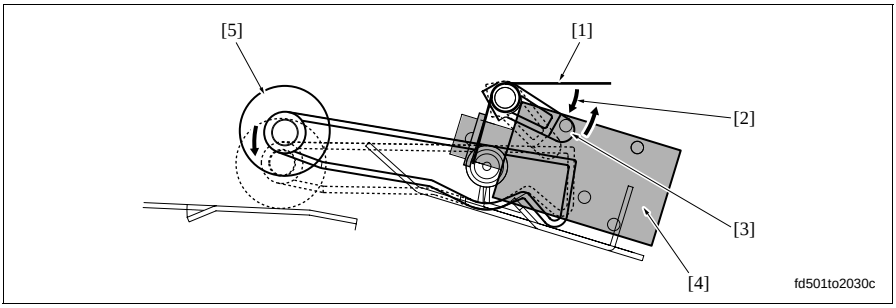
[1] Paper lift motor /Up (M8)
[2] Paper lift motor /Lw (M9)
[3] PI lift plate /Lw
[4] PI lift plate /Up

9.2.2 Paper feed drive



[1] Separation roller /Up
[2] PI registration clutch /Up (CL1)
[3] PI registration clutch /Lw (CL2)
[4] Separation roller /Lw
[5] Rotational direction of separation roller /Lw
[6] Paper feed roller /Lw
[7] Pick-up roller /Lw
[8] PI conveyance motor (M7)
[9] Rotational direction of separation roller /Up
[10] Pick-up roller /Up
[11] Paper feed roller /Up

9.2.3 Pick-up drive



[1] Spring
[2] Direction of spring force
[3] Release arm
[4] PI pick-up solenoids /Up (SD13) and /Lw (SD14)
[5] Pick-up rollers /Up and /Lw

9.3 Operation

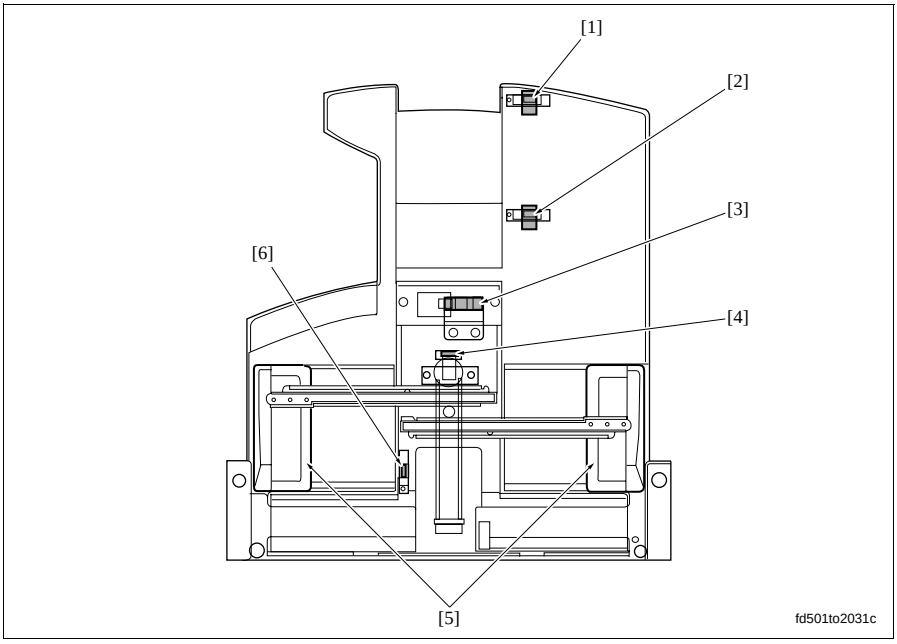
9.3.1 Size detection control

For the size detection of a paper, there are the following two directions for each of the tray /Up and the tray /Lw: that is, the main scan direction and the sub scan direction.

The size detection in the sub scan, when the PI paper set sensors /Up (PS44) and /Lw (PS45) [6] turn ON, is made by the following 3 sensors: PI maximum size sensors /Up (PS47) and /Lw (PS48) [1], L size sensors /Up (PS35) and /Lw (PS41) [2] and S size sensors /Up (PS36) and /Lw (PS42) [3].

When the PS44 and PS45 are OFF, the tray is judged "paper empty."

The size detection in the main scan is made by the paper size VR /Up (VR31) and /Lw (VR32) [4] that are interlocked with the paper regulation plate [5].



[1] PI maximum size sensors /Up (PS47) and /Lw (PS48)

[2] L size sensors /Up (PS35) and /Lw (PS41)

[3] S size sensors /Up (PS36) and /Lw (PS42)

[4] Paper size VR /Up (VR31) and /Lw (VR32)

[5] Paper regulation plate

[6] PI paper set sensors /Up (PS44) and /Lw (PS45)

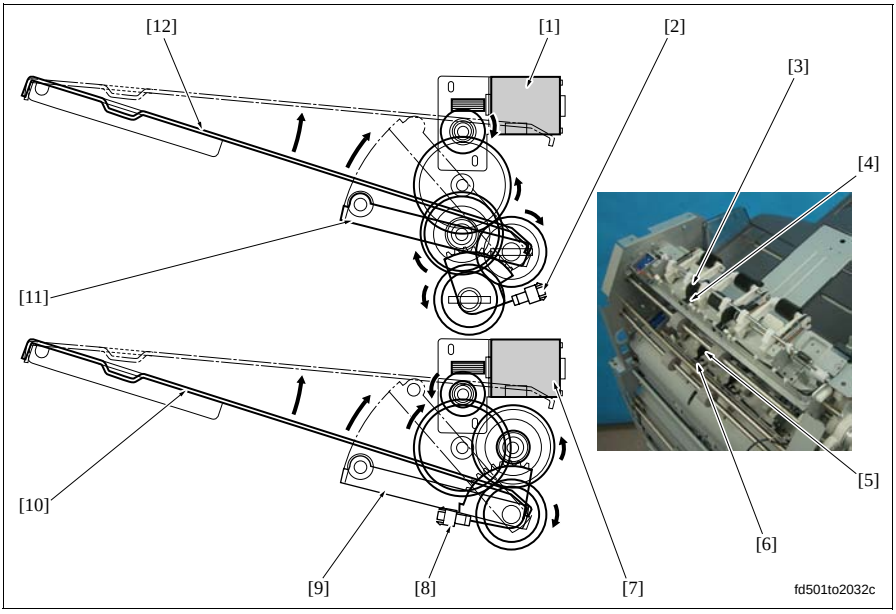
9.3.2 Up/down control

For the up/down of the tray, when the paper lift motors /Up (M8) [1] and /Lw (M9) [7] rotate in the normal and reverse directions, the lift arms /Up [11] and /Lw [9] start up to bring up and down the PI lift plates /Up [12] and /Lw [10]. The lower limit position is detected by the PI lift plate home sensors /Up (PS34) [2] and /Lw (PS40) [8]. The upper limit position is detected by the PI upper limit sensors /Up (PS32) [4] and /Lw (PS38) [6] at the position to which the actuators /Up [3] and /Lw [5] are pushed up by the PI lift plate.

When the PI paper set sensors /Up (PS44) and /Lw (PS45) are ON with the main body start button ON, M8 and M9 turn ON to bring up the PI lift plate. When PS32 and PS38 turn ON, M8 and M9 stop.

While in the copy/print operation, when PS32 and PS38 turn OFF from ON, M8 and M9 turn ON again to bring up the plate until PS32 and PS38 turn ON.

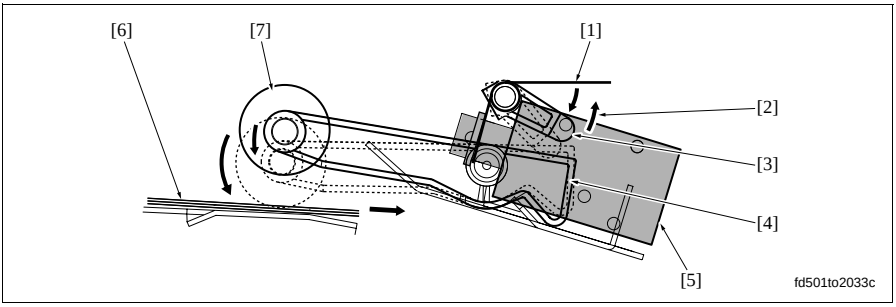
When PS44 and PS45 turn OFF with no paper left, M8 and M9 make a reverse rotation to move down the PI lift plate until PS34 and PS40 turn ON.



[1] Paper lift motor /Up (M8)
[2] PI lift plate home sensor /Up (PS34)
[3] Actuator /Up
[4] PI upper limit sensor /Up (PS32)
[5] Actuator /Lw
[6] PI upper limit sensor /Lw (PS38)
[7] Paper lift motor /Lw (M9)
[8] PI lift plate home sensor /Lw (PS40)
[9] Lift arm /Lw
[10] PI lift plate /Lw
[11] Lift arm /Up
[12] PI lift plate /Up

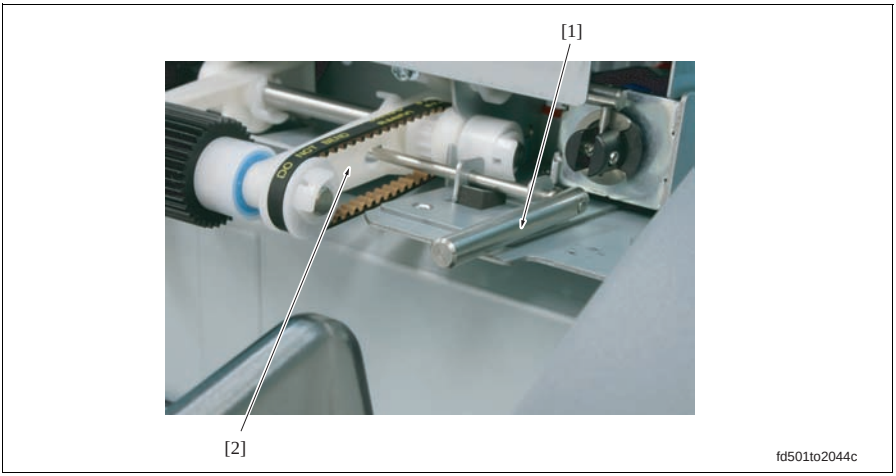
9.3.3 Pick-up mechanism

The picking-up of the paper [6] is made when the PI pick-up solenoids /Up (SD13) and /Lw (SD14) [5] turn ON. The release arm that is pressed down by the spring [1] in the direction of [2] presses down the paper feed arm [4] to place the pick-up rollers /Up and /Lw [7] in the release condition. When SD13 and SD14 [5] turn ON, the release arm is released upward and the pick-up rollers /Up and /Lw [7] go down by their own weight. The pick-up roller that is rotated by the PI conveyance motor (M7) presses down the paper to pick it up.



[1] Spring
[2] Direction of the spring force
[3] Release arm
[4] Paper feed arm
[5] PI pick-up solenoids /Up (SD13) and /Lw (SD14)
[6] Paper
[7] Pick-up rollers /Up and /Lw

⚠ Paper feed arm retaining lever [1] is provided in the pick-up roller section to prevent multi feed.
By moving the paper feed arm retaining levers [1] on the front and back inward, the pick-up rollers on the front and back are secured while the roller in the middle presses against paper.
Multi feed is prevented by reducing the pressure against paper when feeding papers.

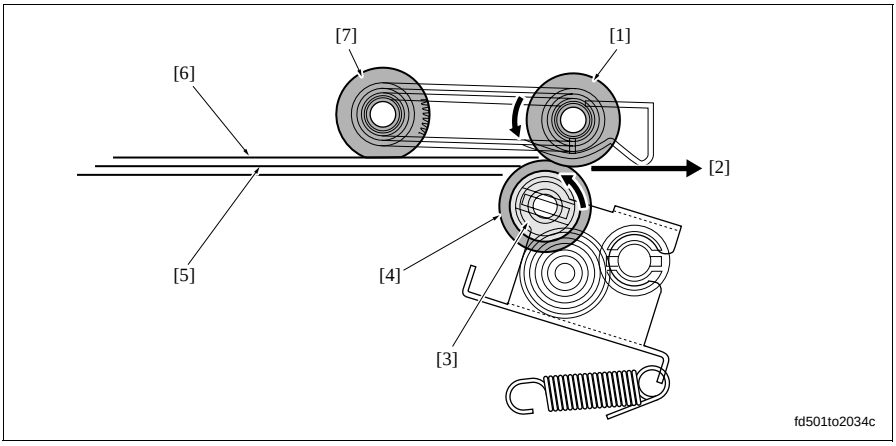


9.3.4 Separation mechanism

The separation roller [4] is driven in the direction opposite to the paper conveyance [2]. However, when no paper is conveyed or only one sheet of paper is conveyed, the frictional force generating between the paper feed roller [1] and the separation roller [4] or the paper and the separation roller is greater than the frictional force of the torque limiter [3]. Accordingly, the separation roller [4] rotates in the direction of the paper conveyance [2] to convey paper to the vertical conveyance section.

When 2 or more sheets of paper are conveyed, the frictional force between these sheets of paper is smaller than the frictional force of the torque limiter [3] and the separation roller [4] rotates in the reverse direction to prevent the lower most paper from being conveyed.

When the PI registration clutches /Up (CL1) and /Lw (CL2) turn ON according to the PI paper feed demand signal, the paper feed roller [1], the separation roller [4], and the pick-up roller [7] rotate to convey the paper one at a time.



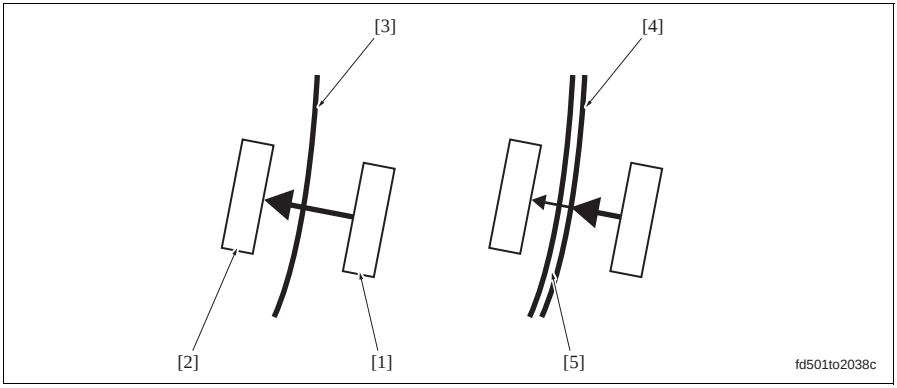
[1] Paper feed rollers /Up and /Lw
[2] Conveyance direction of a sheet of paper
[3] Torque limiter
[4] Separation rollers /Up and /Lw
[5] 2nd sheet of paper
[6] 1st sheet of paper
[7] Pick-up rollers /Up and /Lw

9.3.5 Multi feed detection control

To detect a multi feed while in the PI paper feed, the PI conveyance path is provided with the multi feed sensor. The multi feed sensor is a ultrasonic sensor made up of a pair of a sender and a receiver. This sensor receives ultrasonic waves sent from the multi feed detection board /1 (MFDB1) [1] by the multi feed detection board /2 (MFDB2) [2].

Based on the difference in the amount of ultrasonic waves received when a single sheet of paper [1] and the plural sheets of paper [4] pass through between the sender and the receiver, a check is made to see if paper has been multi fed or not.

The multi feed detection function turns ON (operates) when the LED on the lower side is turned on by the multi feed detection function selection button on the FD operation board (FDOB) and when no selection is made. And it turns OFF (does not operate) when the LED on the upper side is turned on.



[1] Multi feed detection board /1 (MFDB1)
[2] Multi feed detection board /2 (MFDB2)
[3] One sheet of paper
[4] More than one sheet of paper
[5] Layer of air

9.3.6 Paper empty detection control

The detection of the presence of paper in the tray section while in the print stop is made by the PI empty sensors /Up (PS33) and /Lw (PS39). And also, the paper empty detection while in the print is made by the PI set sensors /Up (PS44) and /Lw (PS45) to stop the paper feed from the trays /1 to /5 when PS44 and PS45 detect the trailing edge of the last paper.

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

LS-501/502

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 2.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show ⚠1 to the left of the revised section.
  A number within ⚠1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2006/09	2.0	⚠1	Revision in relation to launching of C6500
2004/10	1.0	—	Issue of the first edition

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LS-501/502

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	Grip conveyance type horizontal stacker	
Conveyance method	Entrance conveyance	Roller conveyance method
	Stacker tray conveyance	Grip conveyance method
	Sub tray conveyance	Roller conveyance method
	Coupling conveyance	Roller conveyance (LS-501 only)
Alignment method	Movable alignment lever (stacker tray only)	
⚠1 Method of stacking	Horizontal stacking	Mixing of original sizes not allowed (stacker tray only)
Shifting method	Conveyance direction shift	Shift amount: 20 mm (stacker tray only)

B. Functions

Mode	Stacker tray non-sort mode	Exited into the stacker tray with no processing made.
	Sub tray mode	Exited into the sub tray with no processing made.
	Stacker tray sort mode	Exited into the stacker tray after being shifted (20mm).
	Coupling mode	Exited into the post-processing unit with no processing made.
Maximum number of sheets loadable	Stacker tray	5,000 sheets (80 g/m^2)
	Sub tray	200 sheets (80 g/m^2)

C. Type of paper

⚠	Paper size	Stacker tray	• When 5,000 sheets loaded SRA3*2, A3, B4, SRA4*2, SRA4S*2, A4, A4S 13 x 19*2, 12 x 18, 11 x 17, 8 1/2 x 14, 8 1/2 x 11, 8 1/2 x 11S 8 1/2 x 13, 8 1/4 x 13, 8 1/8 x 13 1/4, 8 x 13 8K*3, 16K*3 Wide paper*1 : A3, B4, A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8 1/2 x 11, 8 1/2 x 11S, 5 1/2 x 8 1/2, size entry : (Max. 324 x 460 mm) • When 3,000 sheets loaded Coated paper (Sub-scan direction is 380 mm or longer) Custom paper*2 : (Max. 330 x 483 mm, Min.210 x 148mm) • When 2,000 sheets loaded B5, A5 *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China.
		Sub tray	SRA3*2, A3, B4, SRA4*2, SRA4S*2, A4, A4S, B5, B5S, A5, A5S*2, B6S*2, A6S*2 13 x 19*2, 12 x 18, 11 x 17, 8 1/2 x 14, 8 1/2 x 11, 8 1/2 x 11S, 5 1/2 x 8 1/2*1, 5 1/2 x 8 1/2S*2 8 1/2 x 13, 8 1/4 x 13, 8 1/8 x 13 1/4, 8 x 13 8K*3, 16K*3, 16KS*3 Tab paper*4 : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8 1/2 x 11, 8 1/2 x 11S Custom paper*2 : (Max. 330 x 487 mm, Min. 100 x 148 mm) Wide paper*1 : A3, B4, A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8 1/2 x 11, 8 1/2 x 11S, 5 1/2 x 8 1/2, size entry : (Max.324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 C6500: only A4 and 8 1/2 x11. Operation of paper exit with tab area at the trail edge side is not assured.
	Paper weight	Stacker tray	50 sheets to 244 g/m^2
		Sub tray	50 sheets to 300 g/m^2

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	LS-501	AC100 to 240V (DC5V is supplied from the main body)
	LS-502	24V DC (supplied from the main body)
Maximum power consumption	143W or less	
Dimensions	785 (W) x 723 (D) x 1,020 (H) mm	
Weight	Approx. 110 kg	

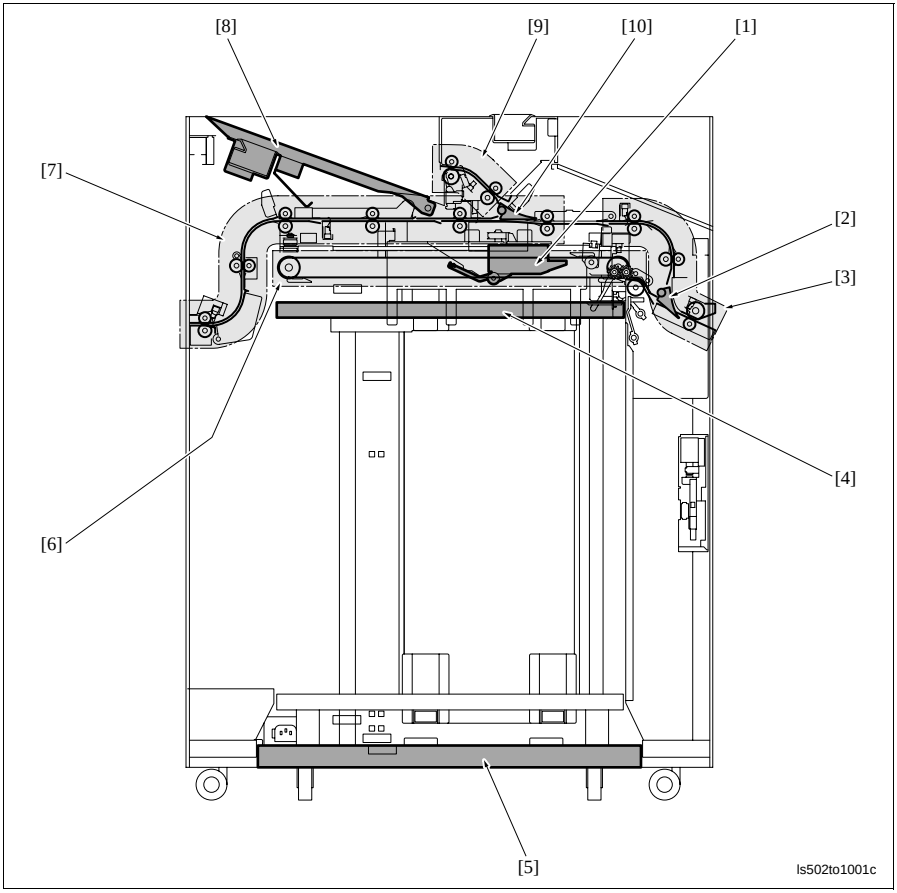
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80%RH

Note

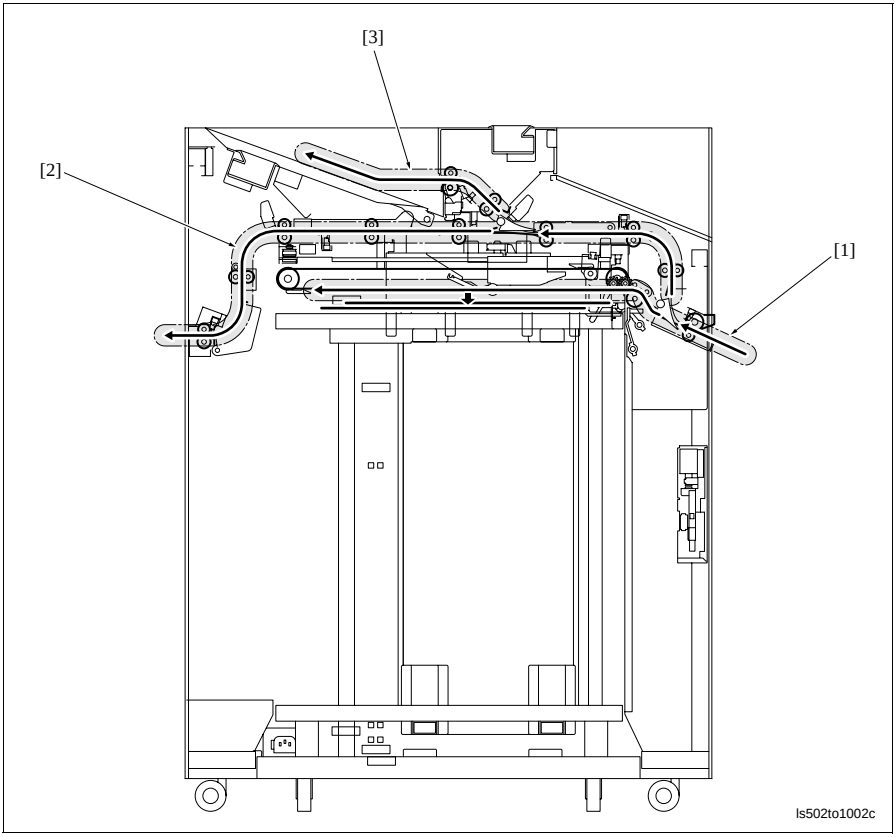
- **The information herein may be subject to change for improvement without notice.**

2. UNIT COMPOSITION



[1] Shift unit
[2] 1st gate
[3] Entrance conveyance section
[4] Stacker tray
[5] Hand cart
[6] Stacker tray conveyance section
[7] Coupling conveyance section
[8] Sub tray
[9] Sub tray conveyance section
[10] 2nd gate

3. PAPER PATH



[1] Stacker tray non-sort/sort mode
[2] Coupling mode
[3] Sub tray mode

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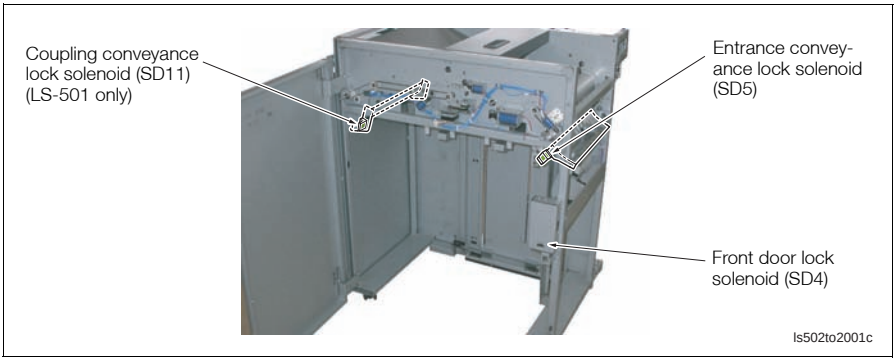
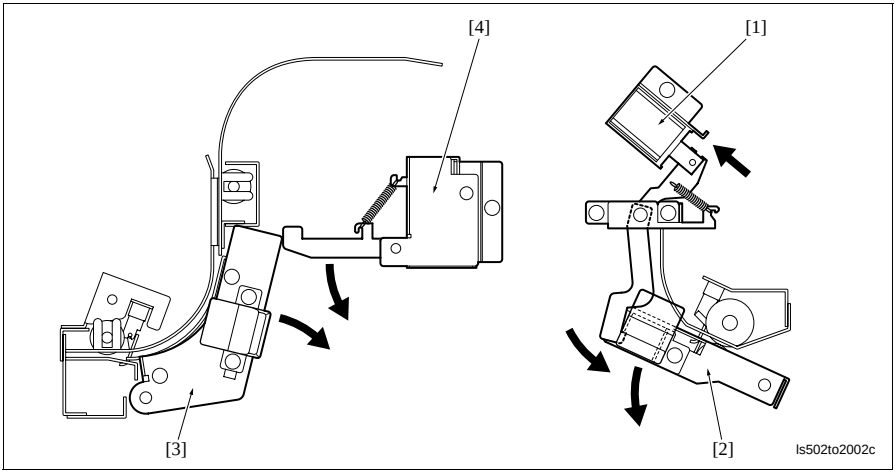
■ COMPOSITION/OPERATION

4. COUPLING CONVEYANCE SECTION

⚠ 4.1 Composition


Coupling conveyance lock solenoid (SD11) (LS-501 only)
Entrance convey-ance lock solenoid (SD5)
Front door lock solenoid (SD4)
ls502to2001c

4.2 Drive



[1] Entrance conveyance lock solenoid (SD5)
[2] Entrance jam release lever
[3] Coupling jam release lever
[4] Coupling conveyance lock solenoid (SD11)

4.3 Operation

4.3.1 Door open/close mechanism

While the LS is in operation, the front door is locked by the front door lock solenoid (SD4), thus making it impossible to open and close it. However, while in the coupling conveyance (coupling mode) or while exiting paper into the sub tray (sub tray mode), the front door can be opened and closed.

Pressing the paper removing switch on the stacker tray operation board (TOB) brings down the stacker tray. And when the stacker tray arm release sensor (PS15) is turn on, SD4 turns off immediately.

The lock is released due to SD4 being turned off and the front door can be opened and closed.

4.3.2 Jam release lever lock mechanism

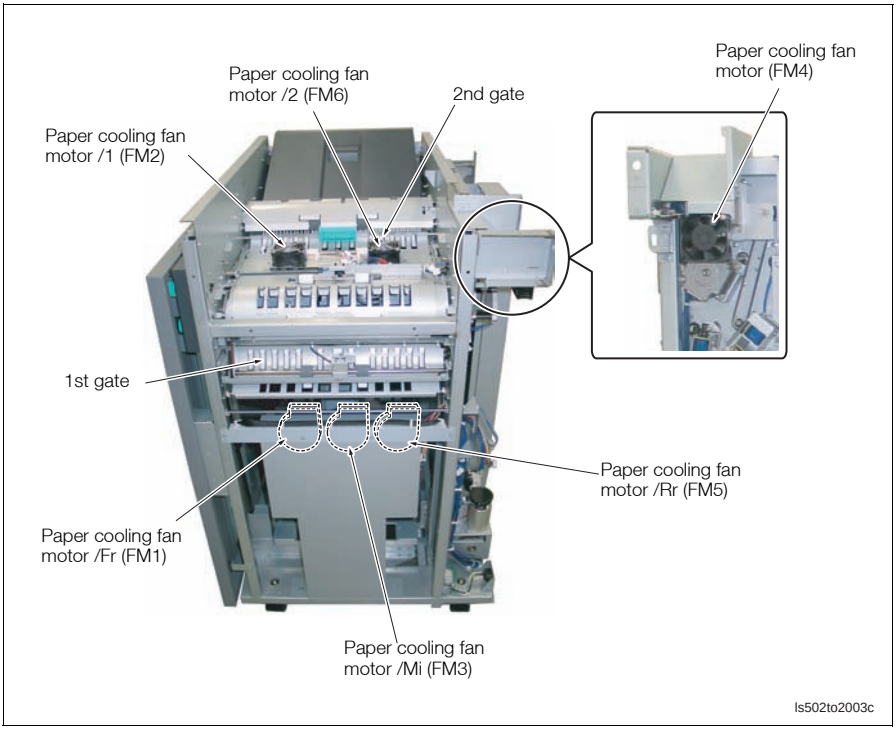
The entrance guide plate and the coupling guide plate are provided with a jam release lever to release jams. The operation of each of the jam release levers is made by the entrance conveyance lock solenoid (SD5) and the coupling conveyance lock solenoid (SD11).

ON/OFF timing of SD5 and SD11

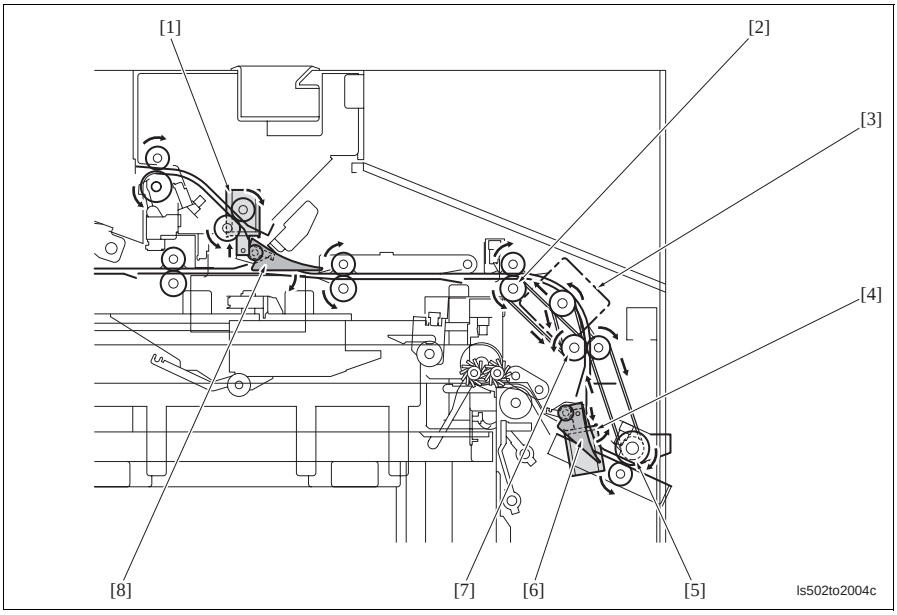
	Operation timing
ON (Lock)	When the stacker tray goes up, and while in printing
OFF (Release)	While in standing by, when the stacker tray goes down after completion of printing, and when the front door is open (except in coupling mode and in sub tray mode)

5. ENTRANCE CONVEYANCE SECTION

⚠ 5.1 Composition


Paper cooling fan motor /2 (FM6)
2nd gate
Paper cooling fan motor (FM4)
Paper cooling fan motor /1 (FM2)
1st gate
Paper cooling fan motor /Rr (FM5)
Paper cooling fan motor /Fr (FM1)
Paper cooling fan motor /Mi (FM3)
ls502to2003c

5.2 Drive



[1] 2nd gate solenoid (SD10)
[2] Coupling conveyance roller /2
[3] Conveyance motor (M2)
[4] 1st gate solenoid (SD1)
[5] Entrance roller
[6] 1st gate
[7] Coupling conveyance roller /1
[8] 2nd gate

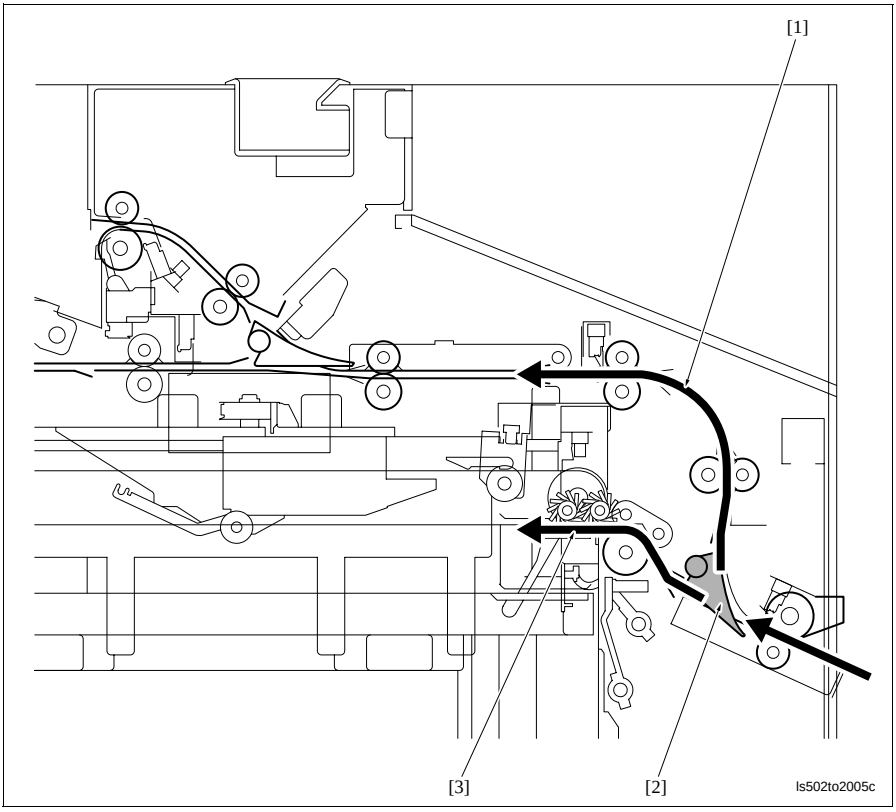
5.3 Operation

5.3.1 Path switching

The path along which paper conveyed to the entrance guide plate is conveyed varies according to the operation mode. The switching of the conveyance path is made by the 1st gate and the 2nd gate.

A. 1st gate

The switching of the conveyance path is made between the stacker tray paper exit (stacker tray non-sort mode and stacker tray sort mode) and the sub tray paper exit (sub tray mode) and the coupling conveyance (coupling mode).



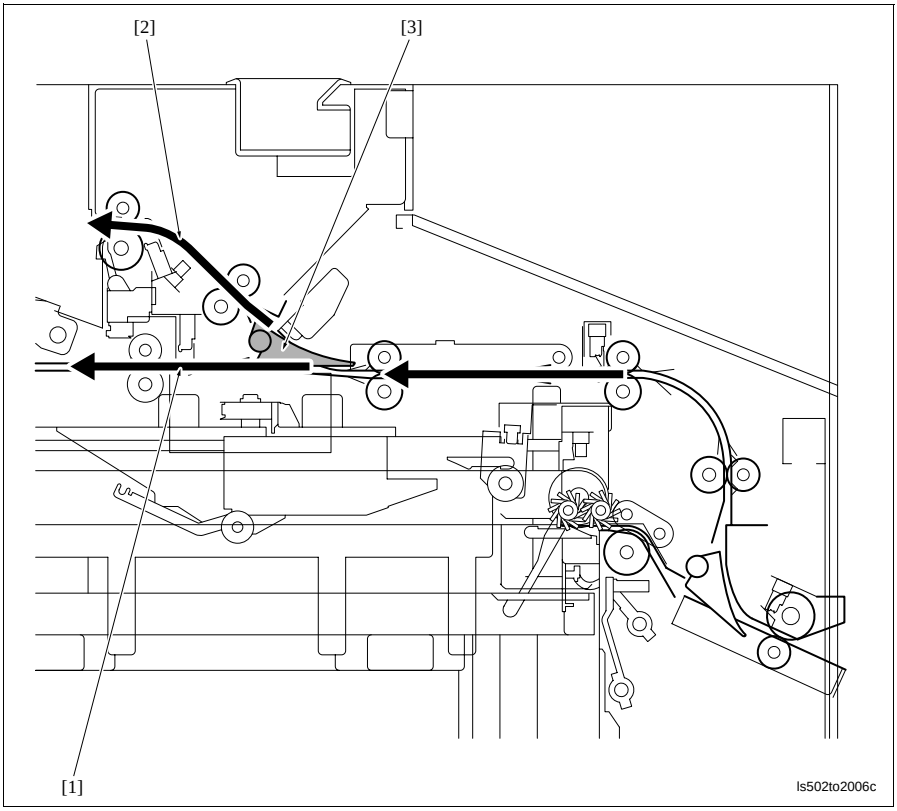
[1] Sub tray mode/coupling mode

[2] 1st gate

[3] Stacker tray non-sort mode/stacker tray sort mode

B. 2nd gate

The conveyance path is switched between the sub tray paper exit (sub tray mode) and the coupling conveyance (coupling mode).

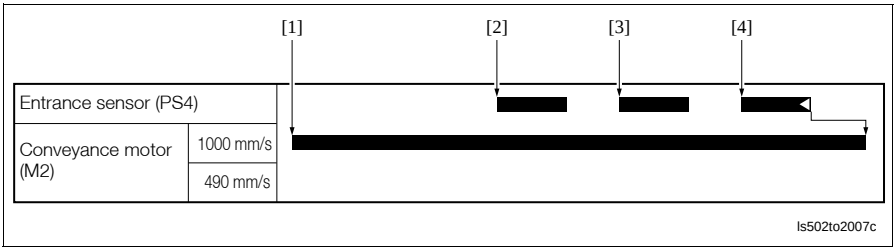


[1] Coupling mode
[2] Sub tray mode
[3] 2nd gate

5.3.2 Conveyance line speed control

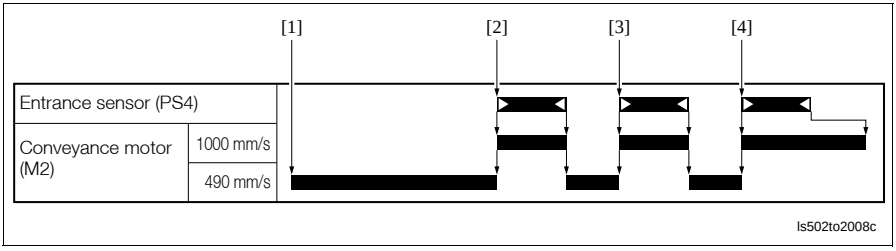
The conveyance process speed of the entrance roller and the coupling conveyance rollers 1/ and 2/ that are driven by the conveyance motor (M2) varies according to the conveyance process speed of the main body. These operations are common to all the modes.

A. When the main body process speed is 1000 mm/s:



[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of paper
[3] 2nd sheet of paper
[4] 3rd sheet of paper

B. When the main body process speed is 490 mm/s:

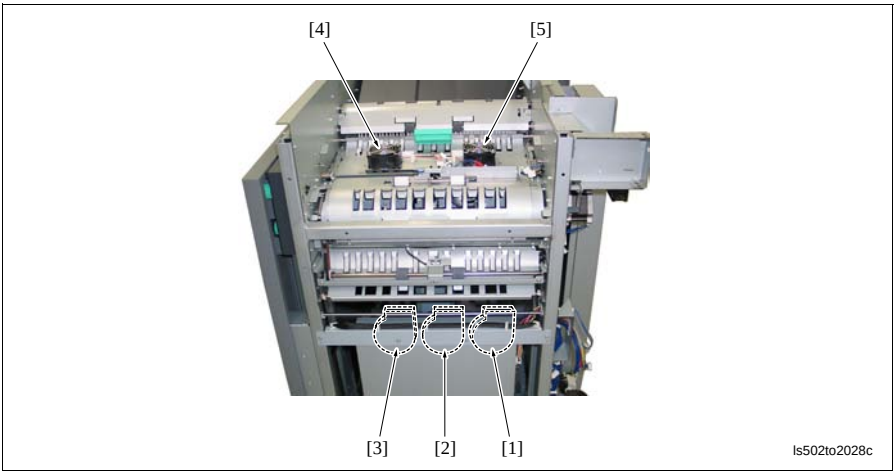


[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of paper
[3] 2nd sheet of paper
[4] 3rd sheet of paper

5.3.3 Paper cooling mechanism

Paper conveyed to the LS is likely to curl up due to fusing heat.

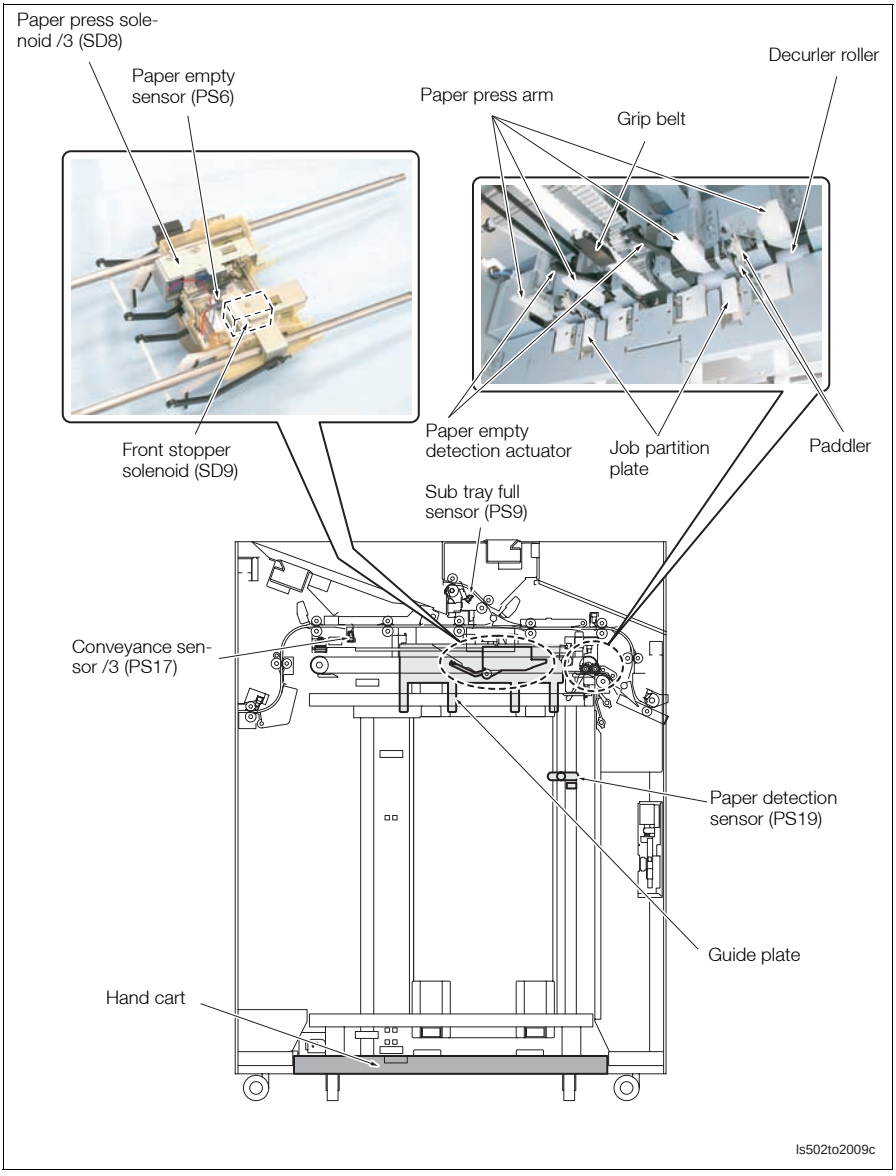
Heat storage accumulated in paper stacked during continuous printing may cause tacking (sheets of paper sticking hard each other by toner) when toner that has been fused is re-fused and adheres. So, fresh air is blown on the paper from under the entrance guide plate and above the path guide of the upper surface of the paper stack section, thus cooling down the paper to correct curling and prevent tacking.



[1] Paper cooling fan motor /Rr (FM5)
[2] Paper cooling fan motor /Mi (FM3)
[3] Paper cooling fan motor /Fr (FM1)
[4] Paper cooling fan motor /1 (FM2)
[5] Paper cooling fan motor /2 (FM6)

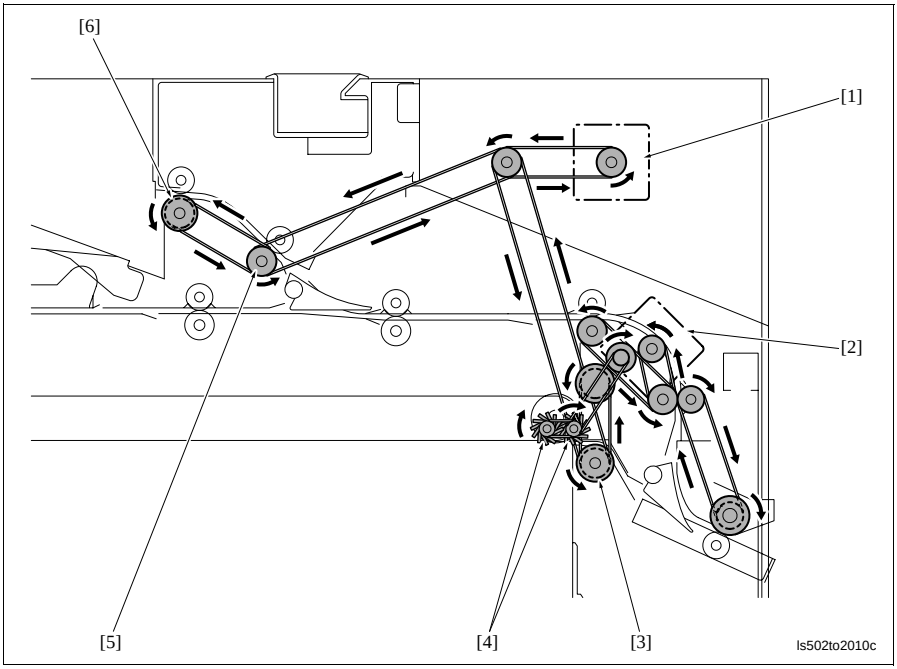
6. CONVEYANCE SECTION

⚠ 6.1 Composition



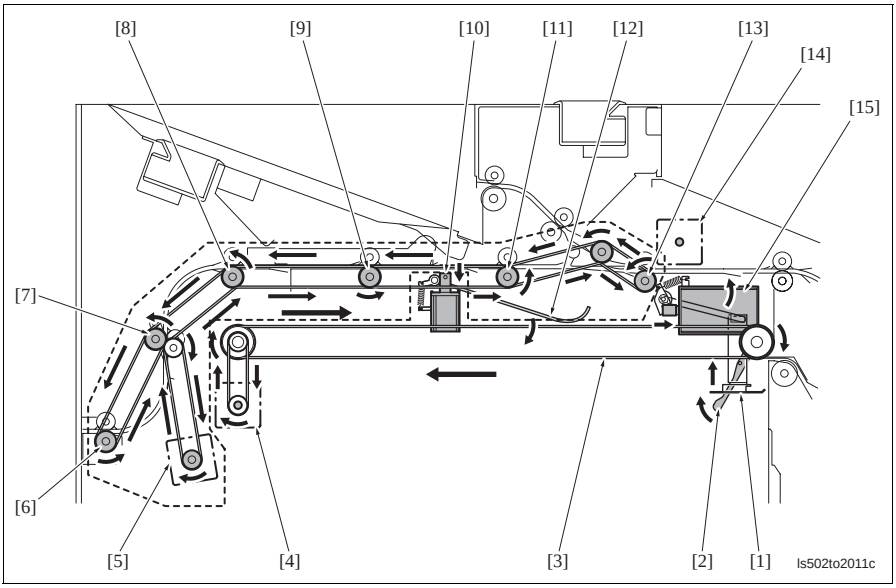
6.2 Drive

6.2.1 Stacker tray/sub tray conveyance drive



[1] Sub tray paper exit motor (M3)
[2] Conveyance motor (M2)
[3] Decurler roller
[4] Paddler
[5] Sub tray conveyance roller
[6] Sub tray paper exit roller

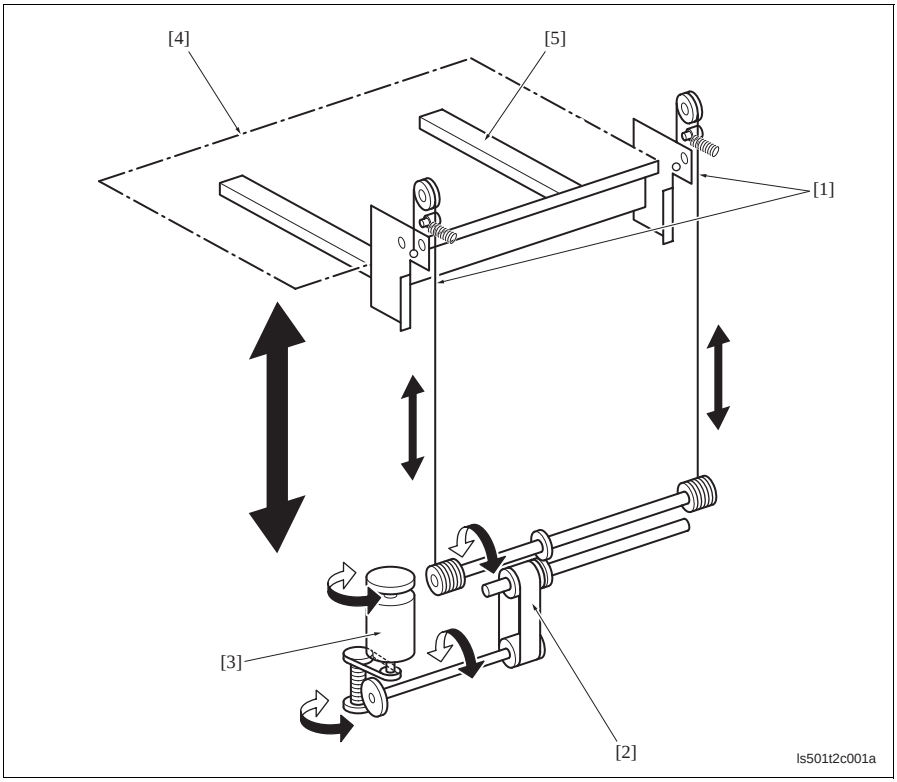
6.2.2 Coupling conveyance/grip belt/paper press arm drive



: LS-501 only

[1] Paper press arm /1
[2] Stacker tray paper empty detection actuator
[3] Grip belt
[4] Grip conveyance motor (M4)
[5] Coupling conveyance motor (M6) : LS-501 only
[6] Coupling paper exit roller : LS-501 only
[7] Coupling conveyance roller /7 : LS-501 only
[8] Coupling conveyance roller /6 : LS-501 only
[9] Coupling conveyance roller /5 : LS-501 only
[10] Paper press solenoid /2 (SD7)
[11] Coupling conveyance roller /4 : LS-501 only
[12] Paper press arm /2
[13] Coupling conveyance roller /3
[14] Coupling conveyance motor (M6) : LS-502 only
[15] Paper press solenoid /1 (SD6)

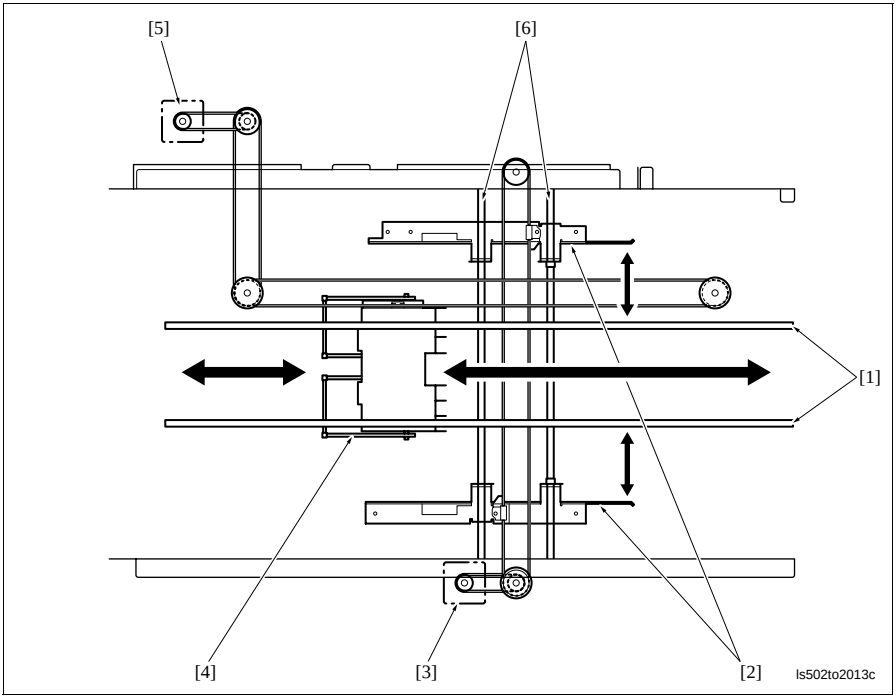
⚠ 6.2.3 Stacker tray up down drive



[1] Wire
[2] Belt
[3] Stacker tray up down motor (M1)
[4] Stacker tray
[5] Stacker tray up down arm

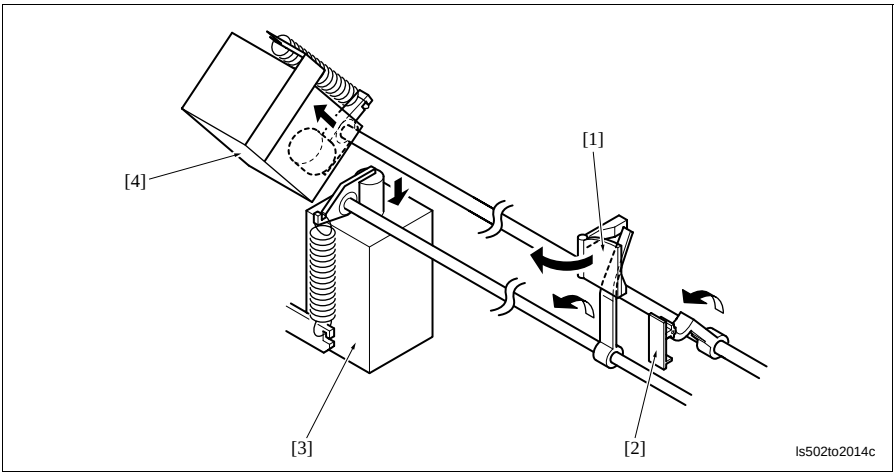
6.2.4 Shift unit/alignment plate drive

LS drawing as seen from above. On the right side is the main body.



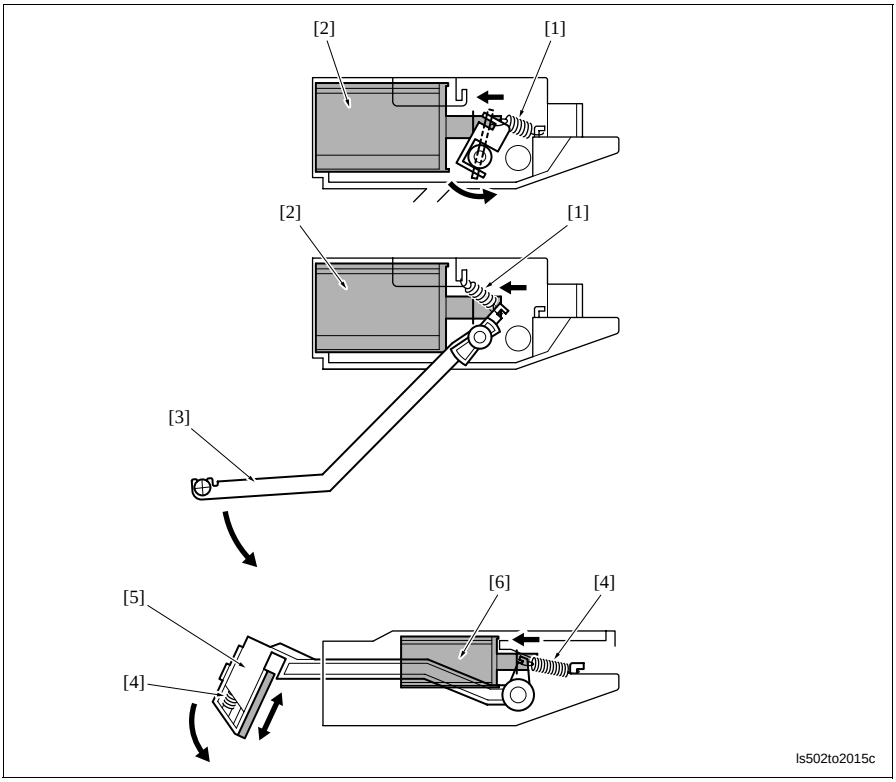
[1] Guide rail
[2] Alignment plate
[3] Alignment motor (M7)
[4] Shift unit
[5] Shift unit motor (M5)
[6] Guide rail

6.2.5 Rear stopper/job partition plate drive



[1] Rear stopper
[2] Job partition plate
[3] Rear stopper solenoid (SD3)
[4] Job partition solenoid (SD2)

6.2.6 Front stopper/paper press arm drive



[1] Spring
[2] Paper press solenoid /3 (SD8)
[3] Paper press arm /3
[4] Spring
[5] Front stopper
[6] Front stopper solenoid (SD9)

6.3 Operation

6.3.1 Stacker tray conveyance

While in the stacker tray non-sort mode and the stacker tray sort mode, paper is conveyed into the stacker tray.

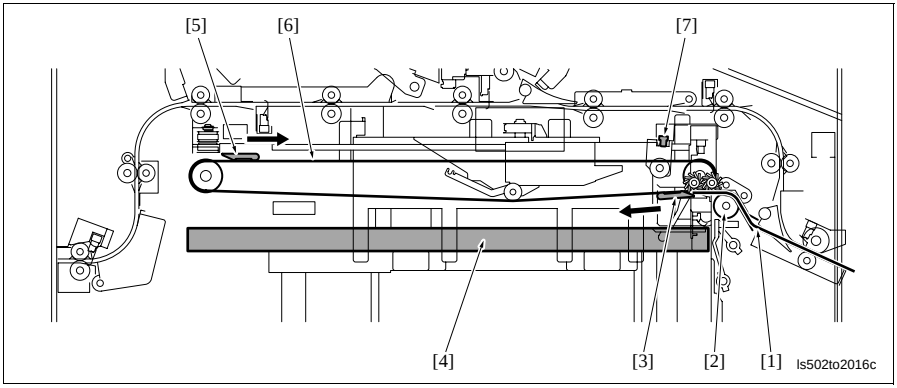
A. Decurler

Paper that has passed through the 1st gate is conveyed to the grip belt by the decurler roller. At this time, the correction of curled paper is made by the decurler roller.

B. Grip conveyance

Paper conveyed by the decurler roller enters and is help by the grip provided on the grip belt. The paper held by the grip is conveyed to the section above the stacker tray by the rotation of the grip belt.

Two grips are provided on the grip belt and each one of them conveys paper one after the other. The position where the grip is waiting for paper from the decurler roller is controlled by the grip conveyance home sensor (PS5).



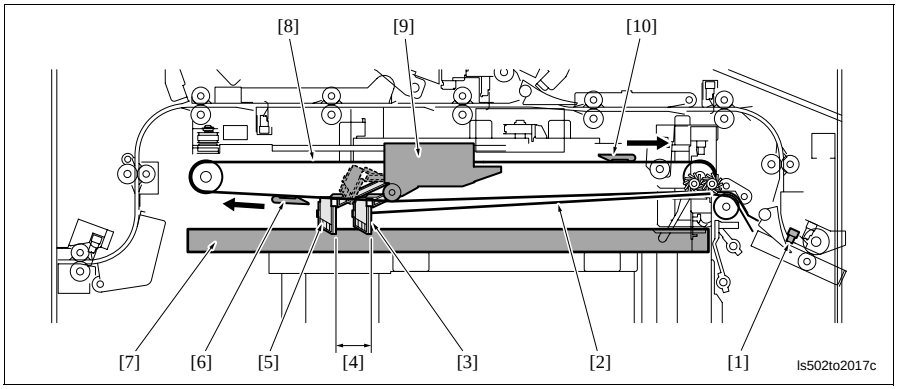
[1] Paper
[2] Decurler roller
[3] Grip
[4] Stacker tray
[5] Grip
[6] Grip belt
[7] Grip conveyance home sensor (PS5)

C. Front stopper control

Paper conveyed by the grip strikes against the front stopper equipped to the shift unit and is released from the grip. At this time, the shift unit has been moved to the position specified in advance for each paper size.

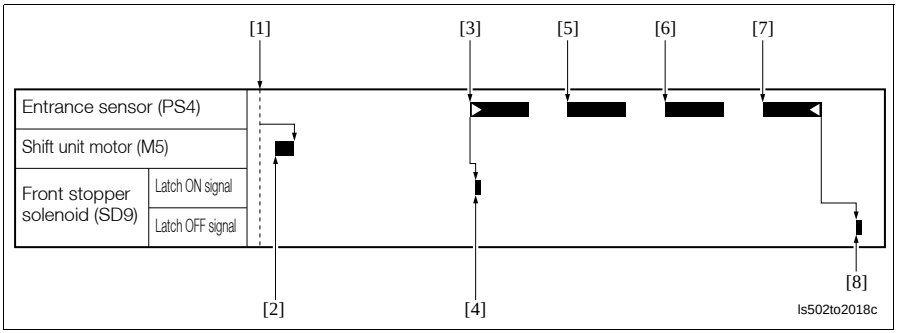
Two types of the front stoppers, more specifically, a movable type and a stationary type, are employed. In stacker tray non-sort mode, only the movable type front stopper is employed. A distance of 20 mm is kept between the position where the movable type front stopper stops and the position in which the stationary type front stopper is, which is the shift distance.

For the front stopper solenoid (SD9) that drives the movable type front stopper, a latch-type solenoid is employed that is not required to be energized to maintain the ON state. However, a latch-type solenoid requires a different control signal for each ON and OFF action.



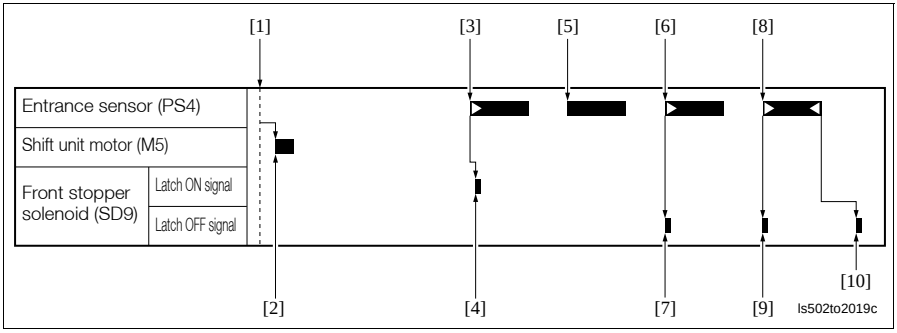
[1] Entrance sensor (PS4)
[2] Paper
[3] Movable type front stopper
[4] 20 mm
[5] Stationary type front stopper
[6] Grip
[7] Stacker tray
[8] Grip belt
[9] Shift unit
[10] Grip

(1) Stacker tray non-sort mode



[1] Main body paper exit sensor (PS3) ON
[2] The shift unit starts to move
[3] 1st sheet of paper
[4] Movable type front stopper ON
[5] 2nd sheet of paper
[6] 3rd sheet of paper
[7] Last sheet of paper
[8] Movable type front stopper OFF

(2) Stacker tray sort mode

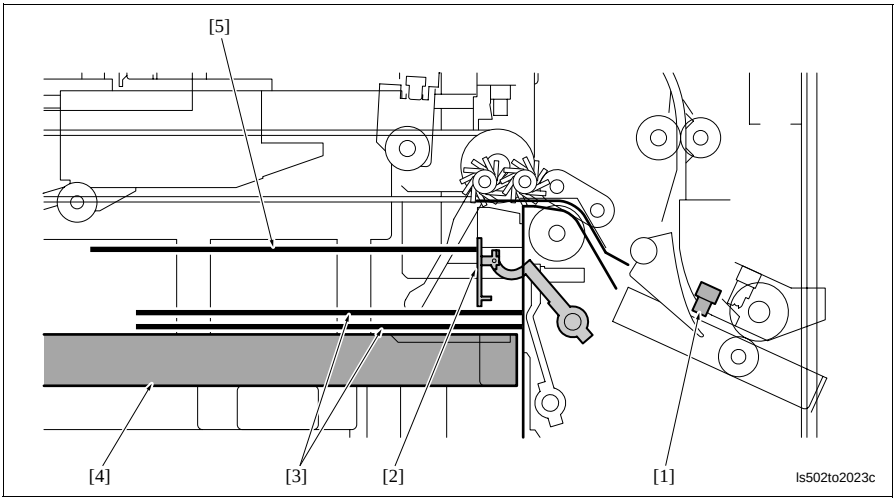


[1] Main body paper exit sensor (PS3) ON
[2] The shift unit starts to move
[3] 1st sheet of paper
[4] Movable type front stopper ON
[5] Last sheet of paper
[6] Shift of the 1st sheet of paper
[7] Movable type front stopper OFF
[8] Shift of the last sheet of paper
[9] Movable type front stopper OFF secured
[10] Movable type front stopper OFF secured

D. Job partition plate

In stacker tray sort mode, the trailing edge of the shift paper is restricted by the job partition plate and the paper is exited onto the stacker tray 20 mm shifted from the non-shift paper. At this time, the upper surface of the non-shift paper does not come to the same level as the lower edge of the job partition plate and the 1st sheet of the shift paper is in possibility of getting into the lower side of the job partition plate. To prevent this, the job partition plate is attached to the upper surface of the non-shift paper that has been exited to restrict the entry of the paper.

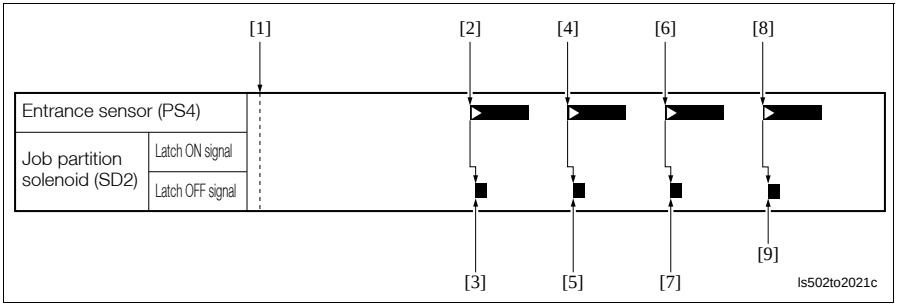
For the job partition solenoid (SD2) that drives the job partition plate, a latch-type solenoid is employed that is not required to be energized to maintain the ON state. However, a latch-type solenoid requires a different control signal for each ON and OFF action.



[1] Entrance sensor (PS4)
[2] Job partition plate
[3] Non-shift paper
[4] Stacker tray
[5] Shift paper

(1) Stacker tray non-sort mode

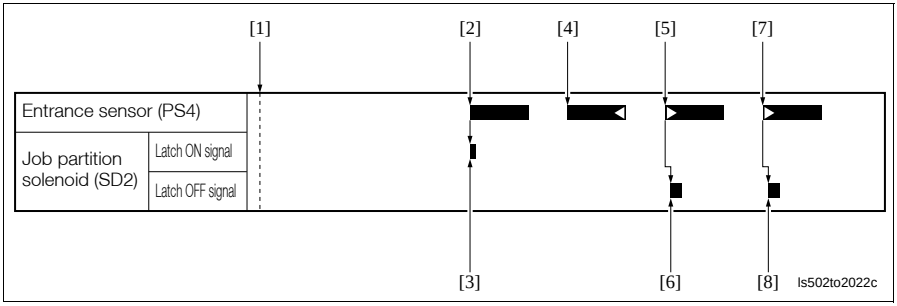
Ex.: Letter 4 sheets



[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of paper
[3] Job partition plate close
[4] 2nd sheet of paper
[5] Job partition plate close
[6] 3rd sheet of paper
[7] Job partition plate close
[8] Last sheet of paper
[9] Job partition plate close

(2) Stacker tray sort mode

Ex.: Letter 2 sheets



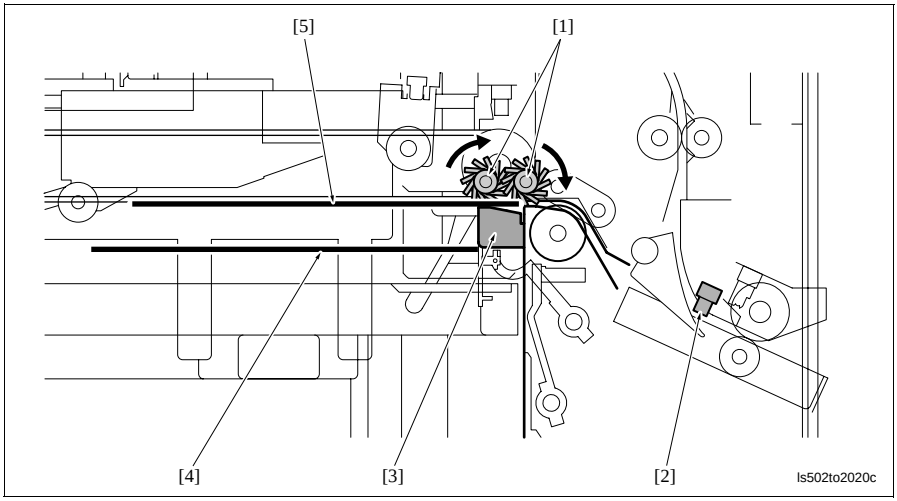
[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of shift paper
[3] Job partition plate open (shift amount: 20 mm)
[4] 2nd sheet of shift paper
[5] 1st sheet of non-shift paper
[6] Job partition plate close
[7] 2nd sheet of non-shift paper
[8] Job partition plate close

E. Rear stopper control

While in the stacker tray sort mode is in shifting, the rear stopper is left open and this plays as a guide for the trailing edge of paper.

To assist the separation of paper released from the grip, the paddle is rotated at a high speed.

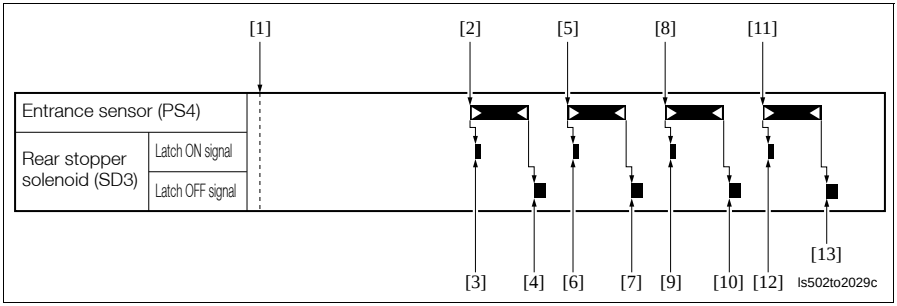
For the rear stopper solenoid (SD3) that drives the rear stopper, a latch-type solenoid is employed that is not required to be energized to maintain the ON state. However, a latch-type solenoid requires a different control signal for each ON and OFF action.



[1] Paddler
[2] Entrance sensor (PS4)
[3] Rear stopper
[4] Paper position while in the stacker tray sort mode
[5] Paper position while in the stacker tray non-sort mode

(1) Stacker tray non-sort mode

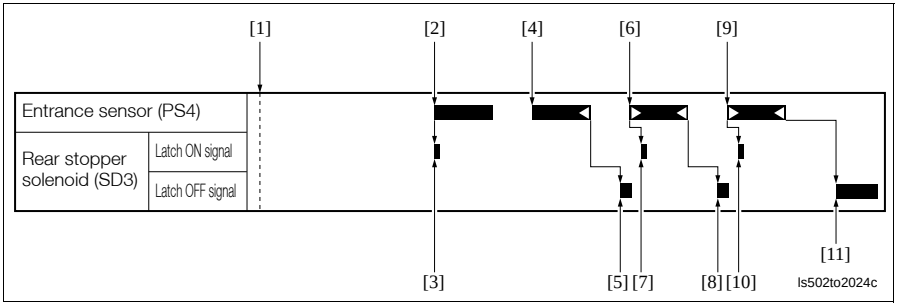
Ex.: Letter 4 sheets



[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of paper
[3] Rear stopper open
[4] Rear stopper close
[5] 2nd sheet of paper
[6] Rear stopper open
[7] Rear stopper close
[8] 3rd sheet of paper
[9] Rear stopper open
[10] Rear stopper close
[11] 4th sheet of paper
[12] Rear stopper open
[13] Rear stopper close

(2) Stacker tray sort mode

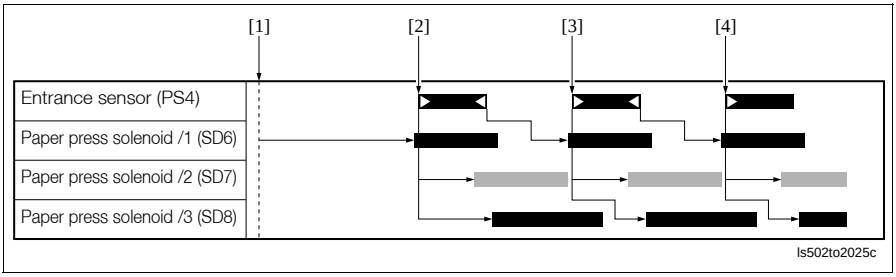
Ex.: Letter 2 sheets



[1] Main body paper exit sensor (PS3) ON
[2] Shift of the 1st sheet of paper
[3] Rear stopper open
[4] Shift of the 2nd sheet of paper
[5] Rear stopper close
[6] Non-shift of the 1st sheet of paper
[7] Rear stopper open
[8] Rear stopper close
[9] Non-shift of the 2nd sheet of paper
[10] Rear stopper open
[11] Rear stopper close

F. Paper press arm

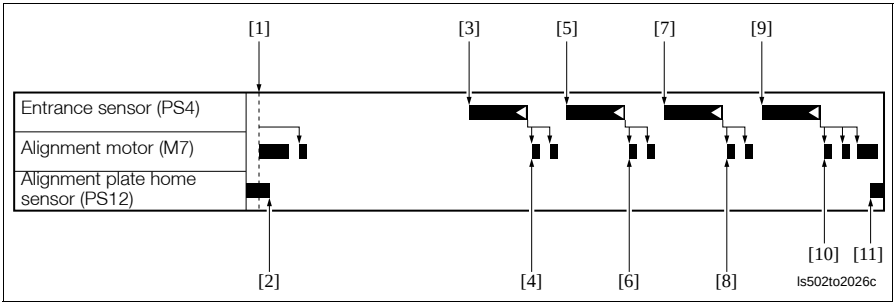
The paper that has been released from the grip is pressed one at a time onto the stacker tray by the paper pressure arms /1, /2 and /3 to be loaded on the stacker tray. However, the operation of the paper pressure arm /2 is limited only to the paper size larger than B4.



[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of paper
[3] 2nd sheet of paper
[4] Last sheet of paper

G. Alignment plate control

Paper loaded on the stacker tray is aligned by the alignment plate for each sheet of paper.



[1] Main body paper exit sensor (PS3) ON
[2] Movement to a position specified for each paper size
[3] 1st sheet of paper
[4] Alignment of the 1st sheet of paper
[5] 2nd sheet of paper
[6] Alignment of the 2nd sheet of paper
[7] 3rd sheet of paper
[8] Alignment of the 3rd sheet of paper
[9] Last sheet of paper
[10] Alignment of the last sheet of paper
[11] Return to the home position

H. Stacker tray up down control

The detection of the upper surface of paper loaded on the stacker tray is made by the paper empty sensor (PS6) through the paper press arm /3. When PS6 is turned off by loading paper that has been exited, the stacker tray up down motor (M1) turns on to lower the stacker tray down to the position at which PS6 turns on. The stacker tray is thus held at a fixed height when paper is being exited.

The number of sheets of paper loaded on the stacker tray is detected by the 2000 sheets stacked sensor (PS13) and the 5,000 sheets stacked sensor (PS14) provided on the up down path of the stacker tray and displayed on the operation panel. (3,000 sheets stacked detection is made by the main unit.)

⚠ When the hand cart once pulled out is put back to its original position, the stacker tray moves up to return to its home position. If the paper detection sensor (PS19) detects that papers are loaded on the stacker tray, the tray stops moving up in order to prevent the alignment plate from being damaged by the uplifted paper.

I. Hand cart detection mechanism

The set condition of the hand cart is detected by the hand cart set switch (RS1). And the set condition of the stacker tray is detected by checking to see if the light from the stacker tray set LED (LED1) gets to the stacker tray set sensor (PS1).

6.3.2 Coupling conveyance

In coupling mode, paper is conveyed to the device connected to the subsequent stage of the LS through the coupling conveyance section.

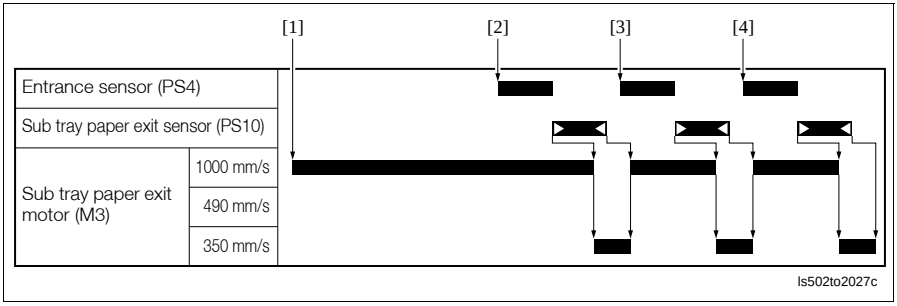
A. Line speed switching

When paper is conveyed from the main body, the conveyance motor (M2) at the entrance conveyance section is rotated at the same speed as the conveyance speed of the main body. When paper is conveyed to the LS, the speed of rotation of M2 is increased up to 1,000 mm/s to convey paper.

6.3.3 Sub tray conveyance

In sub tray mode, paper is exited into the sub tray.

A. Line speed switching



[1] Main body paper exit sensor (PS3) ON
[2] 1st sheet of paper
[3] 2nd sheet of paper
[4] Last sheet of paper

B. Paper full control

When the number of the sheets of paper discharged on the sub-tray gets to 200, the sub tray full sensor (PS9) turns on to give indication of "paper full" on the operation panel.

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

FS-503

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 2.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show ⚠1 to the left of the revised section.
  A number within ⚠1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2006/09	2.0	⚠1	Revision in relation to launching of C6500
2004/10	1.0	—	Issue of the first edition

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	Staple-cut type multi staple device

B. Functions

(1) Functions

Straight mode	Exited into the main tray with no processing made.
Shift mode	Exited into the main tray after being shifted.
Sub tray mode	Exited into the sub tray with no processing made.
Staple mode	Exited into the main tray after being flat-stapled.
Subset staple mode	Bundles of flat-stapled sheets of paper and single sheets of paper being exited at random into the main tray.

(2) Staple

⚠1 Maximum number of sheets to be flat-stapled (Plain paper)	100 sheets of 50 to 81 g/m^2 paper (50 sheets for paper the length of which is 400 mm or longer) 60 sheets of 82 to 91 g/m^2 paper (50 sheets for paper the length of which is 400 mm or longer) 50 sheets of 92 to 130 g/m^2 paper 40 sheets of 131 to 161 g/m^2 paper 25 sheets of 162 to 244 g/m^2 paper
Stapling position	1 staple at the rear (45°), 1 staple at the front, and 2 staples at the center

(3) Maximum number of sheets loadable

⚠ Main tray (Weighing 50 to 244 g/m2)	Straight/Shift	3,000 sheets: A4, A4S, B5, B5S 8 1/2 x 11, 8 1/2 x 11S 16K*3, 16KS*3 1,500 sheets: SRA3*2, A3, B4, SRA4*2, SRA4S*2 13 x 19*2 (straight only), 12 x 18, 11 x 17, 8 1/2 x 14, 8 1/2 x 13, 8 1/4 x 13, 8 1/8 x 13 1/4, 8 x 13 8K*3 wide paper*1: A3, B4, A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8 1/2 x 11, 8 1/2 x 11S, 5 1/2 x 8 1/2, size entry : (Max. 324 x 460 mm) 500 sheets : A5, A5S*2, B6S*2 (straight only), 5 1/2 x 8 1/2*1, 5 1/2 x 8 1/2S*2 Tab paper*4 : A3, B4, A4, A4S, B5, B5S 11 x 17, 8 1/2 x 11, 8 1/2 x 11S custom size (Max. 324 x 460 mm, Min. 182 x 140 mm) Custom paper : 1050 (Max. 324 x 460 mm, Min. 182 x 140 mm) C6500 (Max. 324 x 460 mm, Min. 148 x 148 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 C6500: only A4 and 8 1/2 x11. Operation of paper exit with tab area at the trail edge side is not assured.	
	Staple mode	Staple sheet	Set
		2 to 9	150 (paper length 182 to 364mm) 75 (other than paper length 182 to 364mm)
		10 to 20	50
		21 to 30	30
		31 to 40	25
		41 to 50	20
		51 to 60	15
		61 to 100	10

⚠	Sub tray (Weighing 50 to 300 g/m^2)	SRA3*2, A3, B4, SRA4*2, SRA4S*2 A4, A4S, B5, B5S, A5, A5S*2, B6S*2, A6S*2 13 x 19*2, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½*1, 5½ x 8½S*2 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K*3, 16K*3, 16KS*3 Tab paper*4 : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8½ x 11, 8½ x 11S, custom size (Max. 324 x 460 mm, Min. 182 x 140 mm) Custom paper : 1050 (Max. 324 x 460 mm, Min. 182 x 140 mm), C6500 (Max. 330 x 487 mm, Min. 100 x 148 mm) Wide paper*1 : A3, B4, A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8½ x 11, 8½ x 11S, 5½ x 8½, size entry : (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 C6500: only A4 and 8½ x11. Operation of paper exit with tab area at the trail edge side is not assured.

C. Type of paper

(1) Staple

⚠	Paper size	SRA3*2, A3, B4, SRA4*2, SRA4S*2, A4, A4S, B5, A5 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½*1 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K*3, 16K*3 Tab paper*4 : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8½ x 11, 8½ x 11S, custom size (Max. 324 x 460 mm, Min. 182 x 140 mm) Custom paper : 1050 (Max. 324 x 460 mm, Min. 182 x 140 mm), C6500 (Max. 324 x 460 mm, Min. 210 x 148 mm) Wide paper*1 : A3, B4, A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8½ x 11, 8½ x 11S, 5½ x 8½, size entry : (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 C6500: only A4 and 8½ x11. Operation of paper exit with tab area at the trail edge side is not assured.	
	Applicable paper	Plain paper, high-quality paper, book paper	
	Paper weight	Main tray	50 g/m^2 to 244 g/m^2

D. Maintenance

Maintenance	Same as the main body
Machine service life	Same as the main body

E. Machine data

Power source	24/5V DC (supplied from the main body)
Maximum power consumption	110VA
Dimensions	When the main tray is pulled out: 915 (W) x 656 (D) x 1020 (H) mm When the main tray is set in: 798 (W) x 656 (D) x 1020 (H) mm When the main tray is removed: 544 (W) x 656 (D) x 1020 (H) mm
Weight	Approx. 80 kg

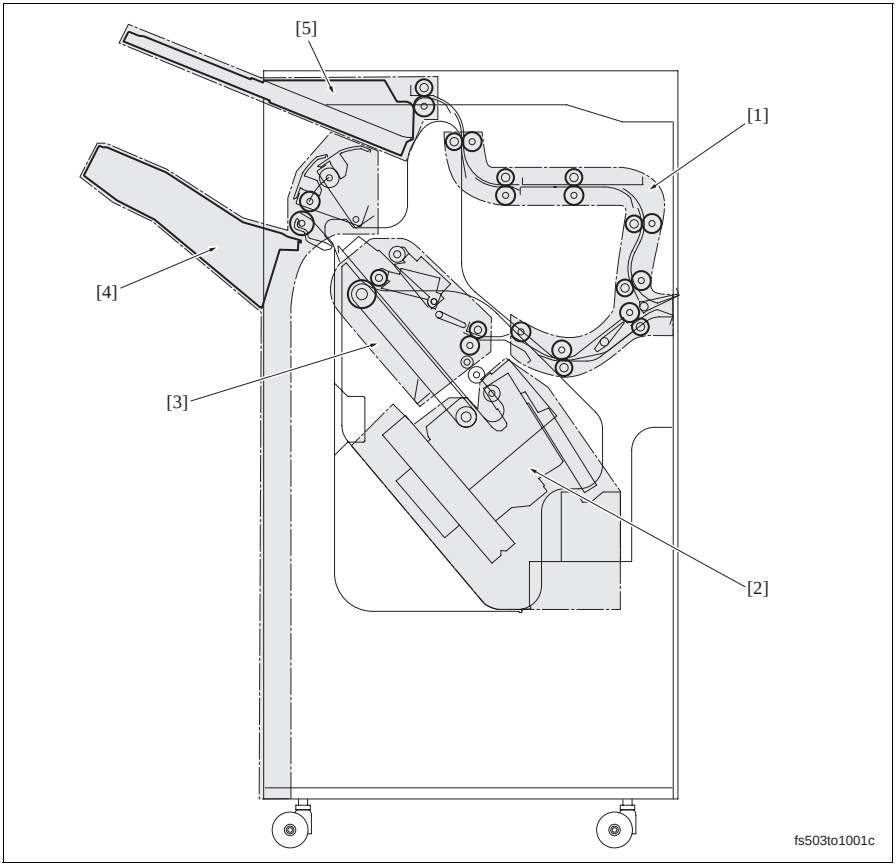
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

Note

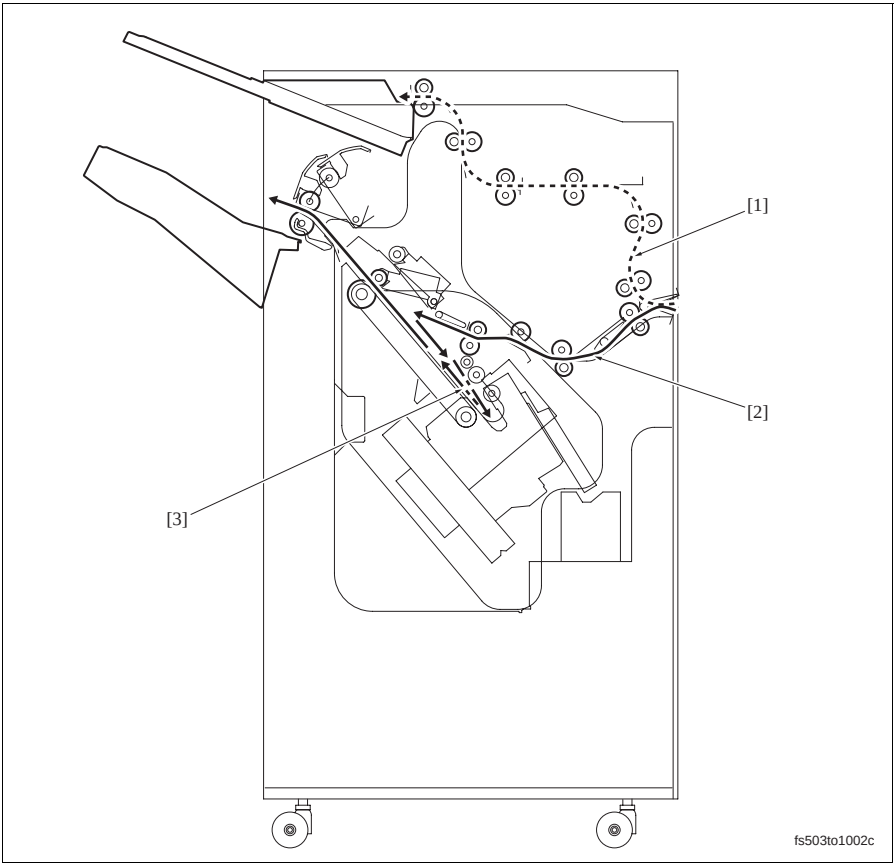
- **The information herein may be subject to change for improvement without notice.**

⚠ 2. UNIT COMPOSITION



[1] Paper conveyance section
[2] Stapler section
[3] Stacker section
[4] Main tray section
[5] Sub tray section

⚠ 3. PAPER PATH



[1] Sub tray paper path

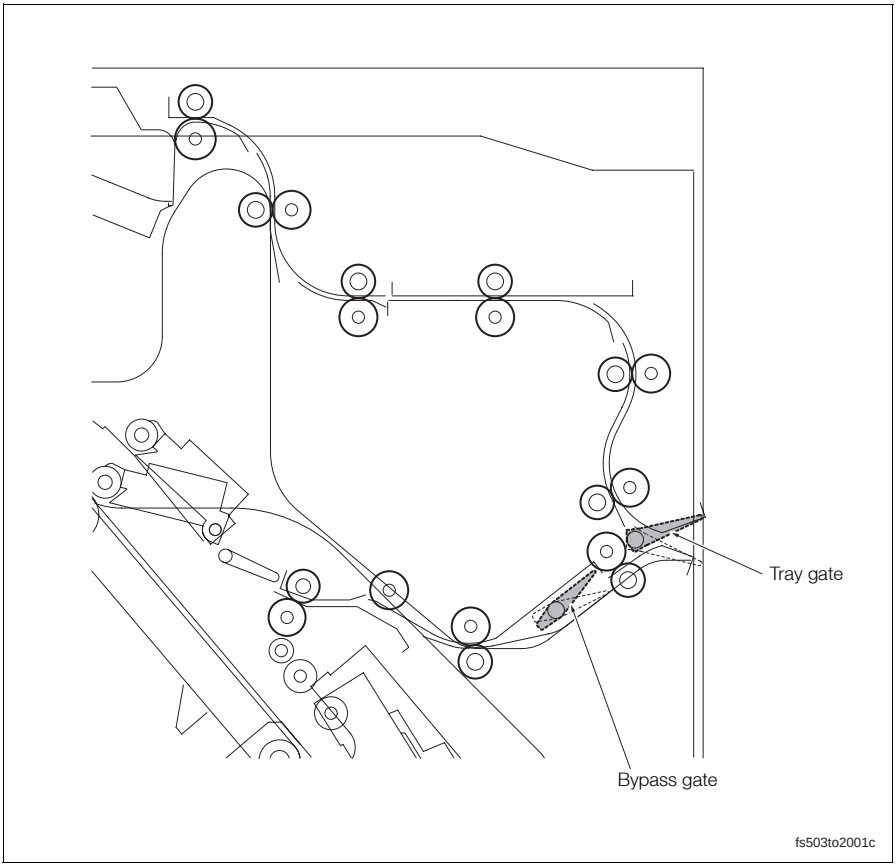
[2] Main tray paper path (straight/sort/staple)

[3] Main tray paper path (only while in stapling)

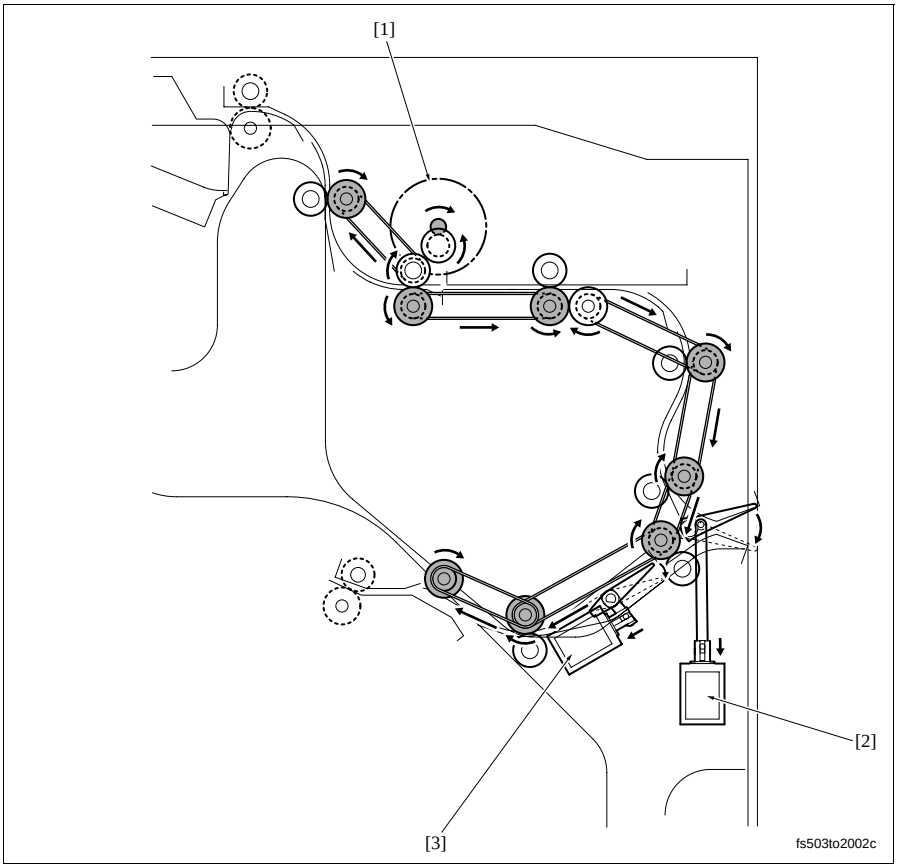
■ COMPOSITION/OPERATION

4. PAPER CONVEYANCE SECTION

⚠ 4.1 Composition



4.2 Drive



[1] Conveyance motor (M1)
[2] Gate solenoid (SD2)
[3] Bypass solenoid (SD5)

4.3 Operation

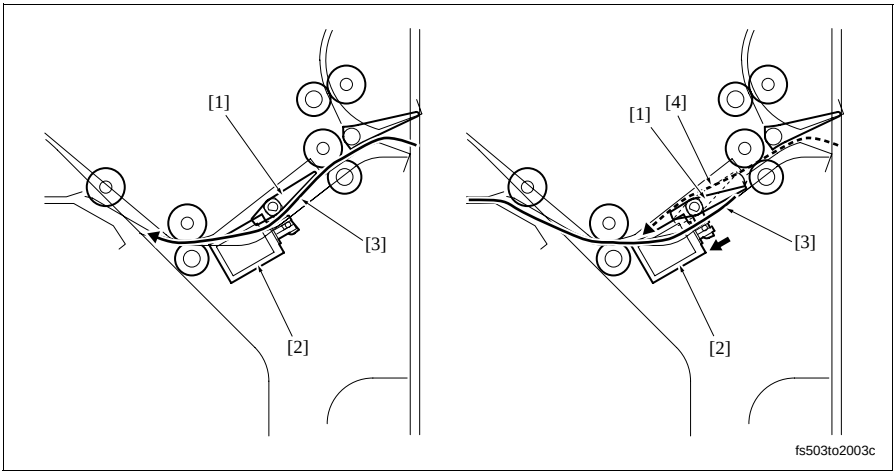
4.3.1 Conveyance path switching

A. Tray gate control

The tray gate switches the paper conveyance path between the main tray and the sub tray.
The tray gate is normally set to the conveyance path to the main tray. When paper is exited to the sub tray, however, the gate is switched to the path to the sub tray through the drive of the solenoid (SD2).

B. Bypass gate control

The bypass gate is provided on the paper path to the stacker section. Even while in the staple operation, the bypass gate conveys the next page to reduce a loss of time for a high productivity.
The drive of the bypass gate [1] is made by the bypass solenoid (SD5) [2]. The operation of SD5 is limited only to the small-sized paper (A4, B5 and 8½ x 11) in the staple mode.
For the 1st page on and after the 2nd copy, paper is sent to the regular route [3]. SD5 operates only on the 2nd page to send paper to the bypass route [4]. The 1st and 2nd pages are put upon one another to be conveyed to the stacker simultaneously. On and after the 3rd page, SD5 is released and paper is sent on the regular route a sheet of paper at a time.



[1] Bypass gate
[2] Bypass solenoid (SD5)
[3] Regular route
[4] Bypass route

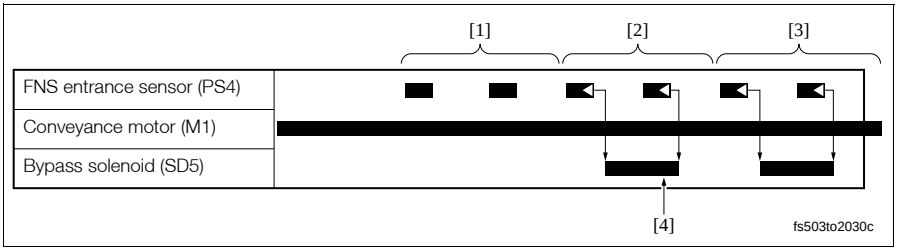
(1) In the case of the 1st copy

The bypass solenoid (SD5) does not operate when the paper of the 1st copy is passing through it.

(2) In the case of the 2nd and subsequent copies

A specified period of time after the FNS entrance sensor (PS4) detects the trailing edge of the 1st page of the 2nd copy, the bypass solenoid (SD5) turns ON to draw the 2nd page of the 2nd copy into the bypass route. A specified period of time after the PS4 detected the trailing edge of the 2nd page of the 2nd copy, the bypass solenoid turns OFF.

SD5 does not turn on when the 3rd and subsequent pages are being conveyed.



[1] 1st copy

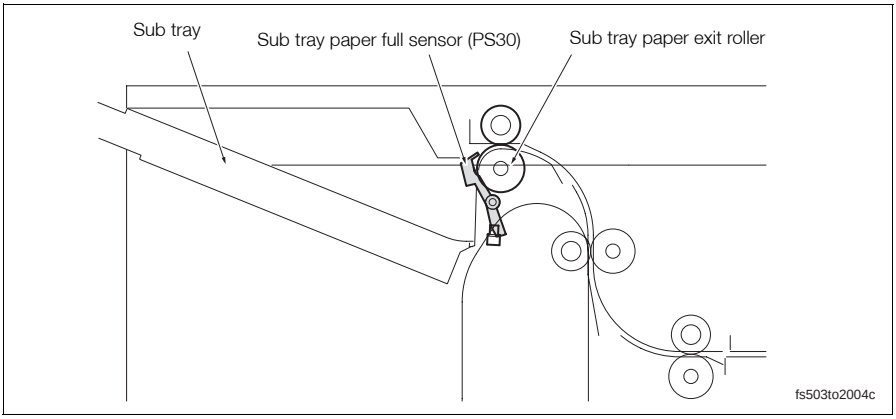
[2] 2nd copy

[3] 3rd copy

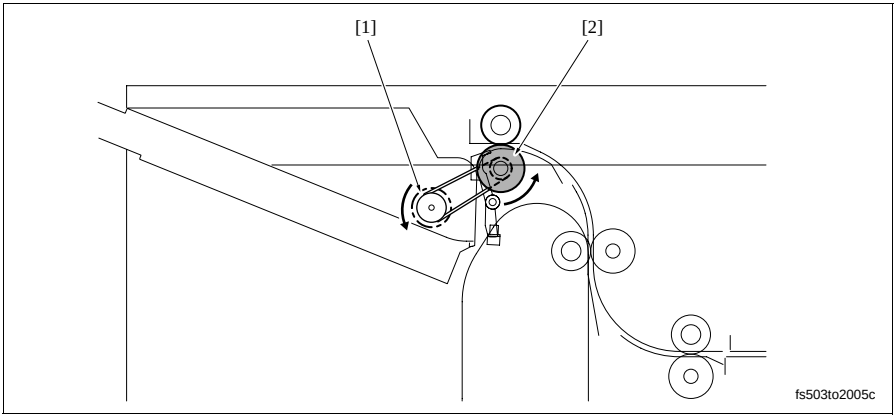
[4] Drawing of the 2nd page of the 2nd copy into the bypass

5. SUB TRAY SECTION

⚠ 5.1 Composition



5.2 Drive



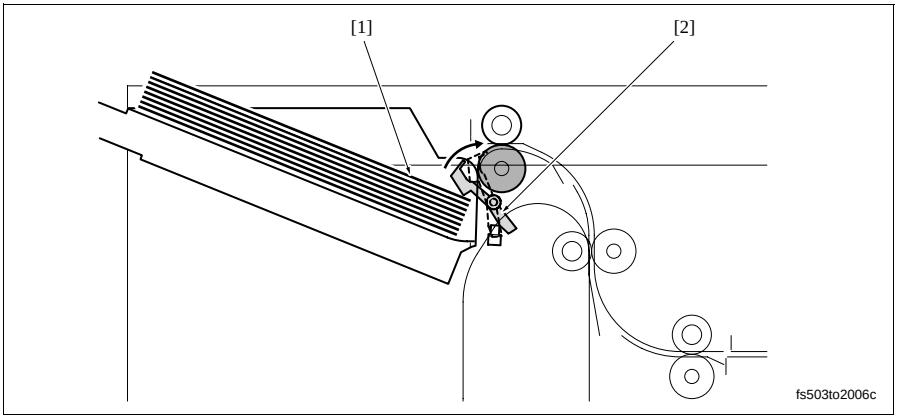
[1] Sub tray paper exit motor (M6)

[2] Sub tray paper exit roller

5.3 Operation

A. Sub tray paper full detection control

When paper that has been exited into the sub tray gets to the specified thickness, the sub tray paper full sensor (PS30) turns ON to send the "sub tray paper full" information to the main body. Then, the main body displays the massage on the operation panel.

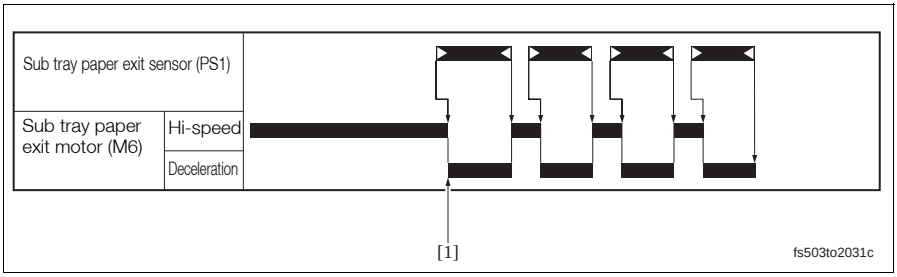


[1] Paper exited

[2] Sub tray paper full sensor (PS30)

B. Conveyance speed switching control

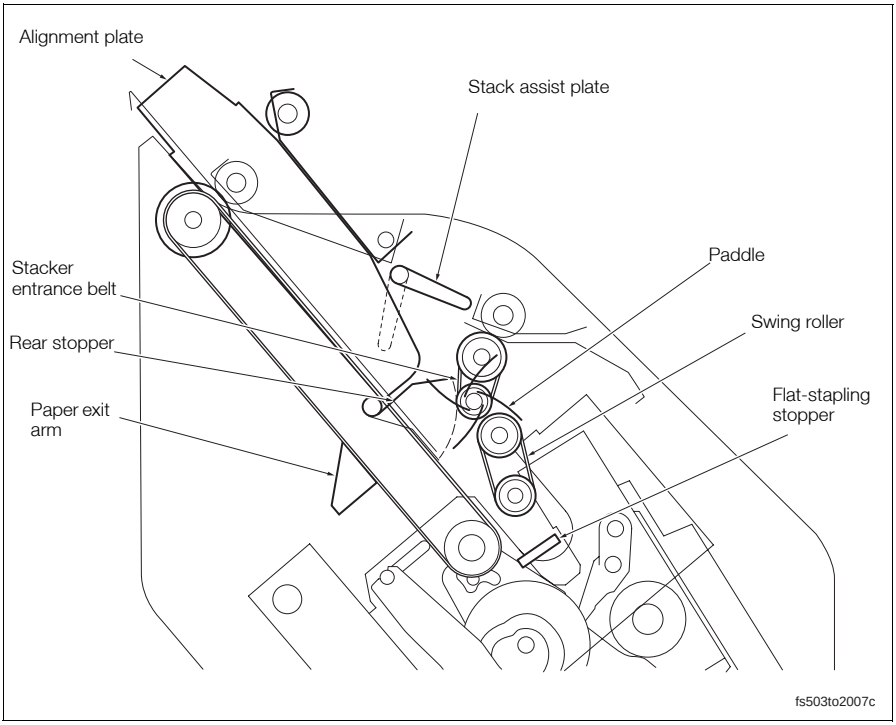
Paper conveyed by the conveyance motor (M1) is decelerated for each sheet of paper to be exited into the sub tray, thus preventing paper from having an uneven edge.



[1] Deceleration of the sub tray paper exit motor (M6)

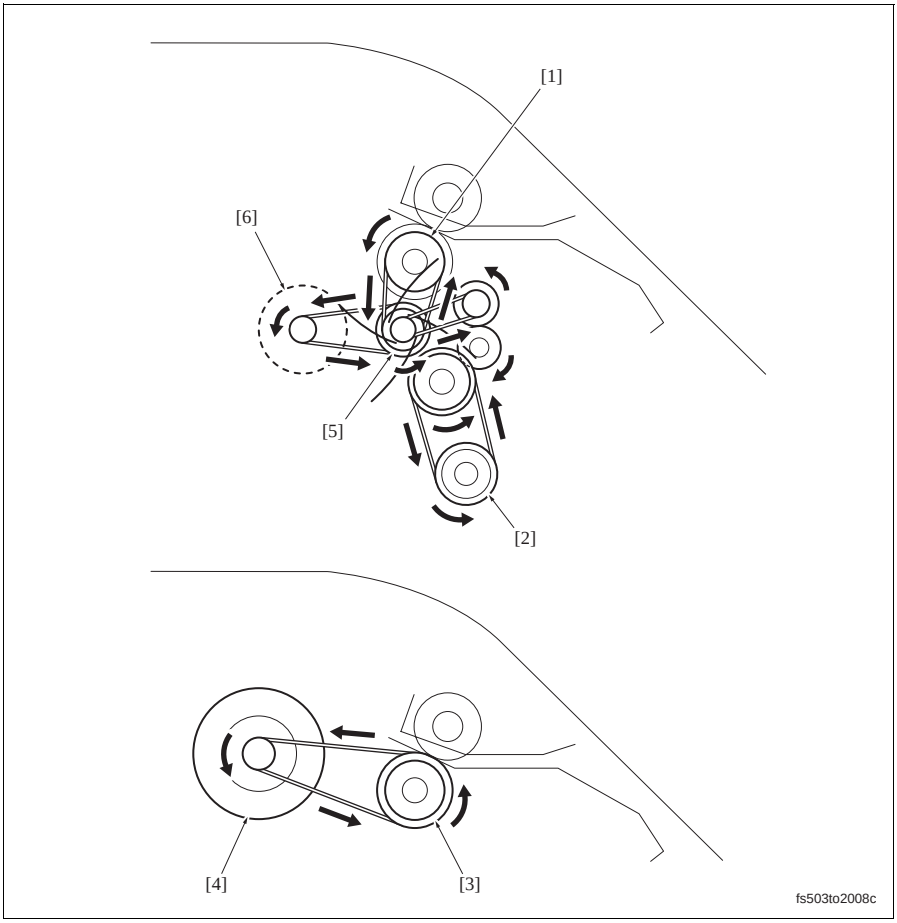
6. STACKER SECTION

⚠ 6.1 Composition



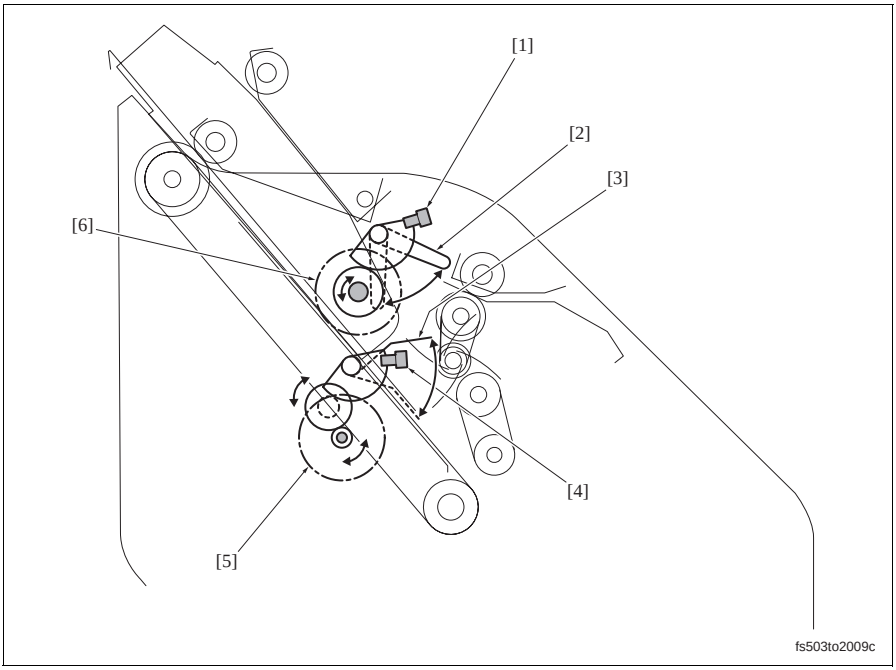
6.2 Drive

6.2.1 Stacker entrance roller/paddle drive



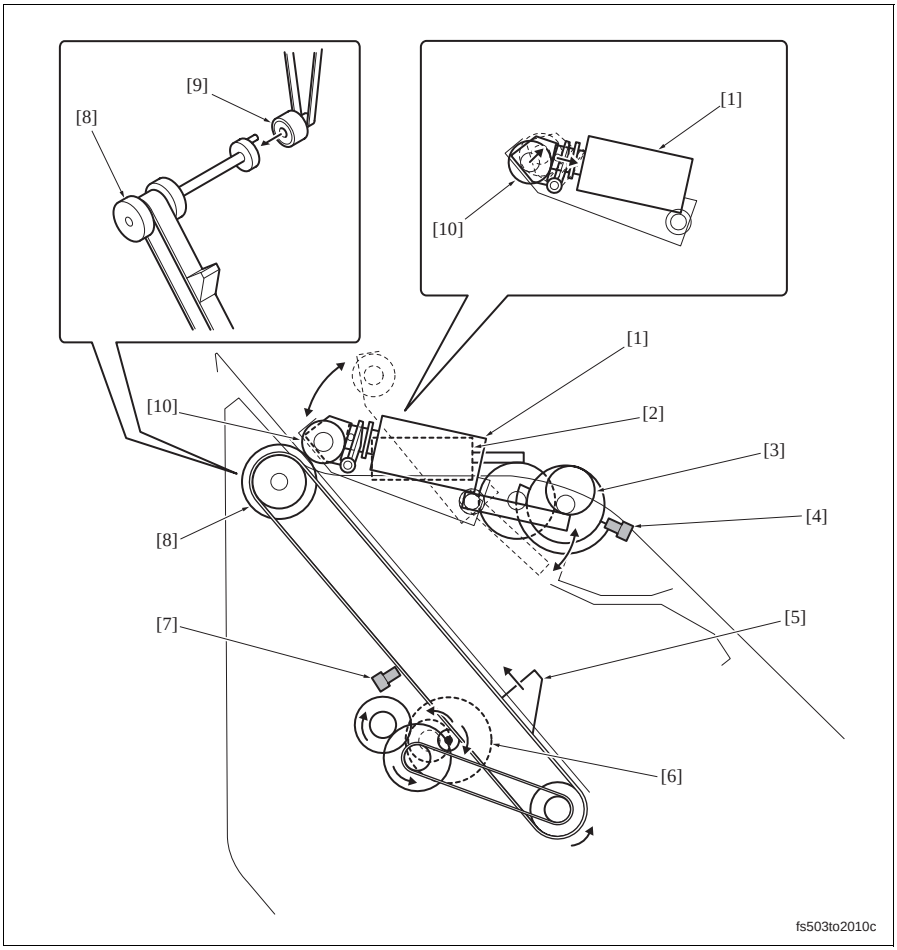
[1] Stacker entrance belt
[2] Swing roller
[3] Stacker entrance roller
[4] Stacker entrance motor (M13)
[5] Paddle
[6] Paddle motor (M2)

6.2.2 Stack assist plate/rear stopper drive



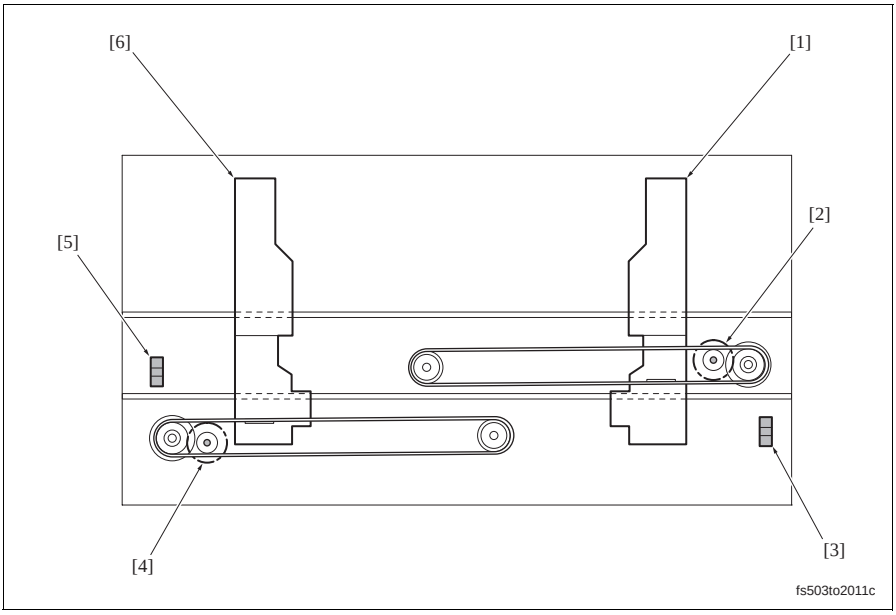
[1] Stack assist home sensor (PS32)
[2] Stack assist plate
[3] Rear stopper
[4] Rear stopper home sensor (PS35)
[5] Rear stopper motor (M26)
[6] Stack assist motor (M24)

6.2.3 Intermediate roller/paper exit arm drive



[1] Intermediate roller release solenoid (SD7)
[2] Intermediate roller open close motor (M25)
[3] Eccentric cam
[4] Intermediate roller home sensor (PS33)
[5] Paper exit arm
[6] Paper exit arm motor (M23)
[7] Paper exit arm home sensor (PS9)
[8] Intermediate roller /Lw
[9] Coupling
[10] Intermediate roller /Up

6.2.4 Alignment drive



[1] Alignment plate /Rr
[2] Alignment motor /Rr (M5)
[3] Alignment home sensor /Rr (PS8)
[4] Alignment motor /Fr (M22)
[5] Alignment home sensor /Fr (PS31)
[6] Alignment plate /Fr

6.3 Operation

6.3.1 Stacker conveyance speed control

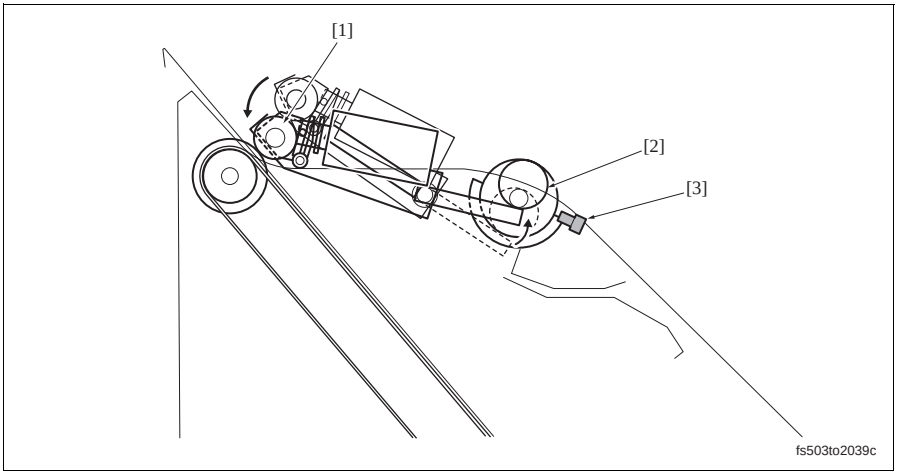
Paper conveyed by the conveyance motor (M1) is sent to the stacker when the stacker entrance motor (M13) is decelerated a specified period of time after the stacker entrance sensor (PS5) turns ON and before it runs through the stacker entrance roller.

6.3.2 Intermediate roller control

The roller drive of the intermediate roller /Lw is transmitted from the main tray paper exit motor (M7) by the belt and the coupling, and the transmission of the conveyance power to paper is made by the pressure/release of the intermediate roller /Up.

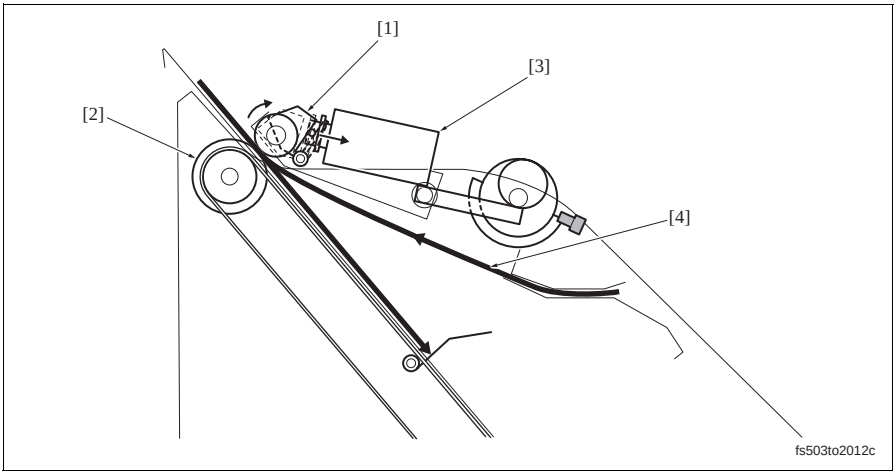
A. Non-staple mode control

While in the non-staple mode, when the start signal is turned ON, the intermediate roller /Up [1] is driven up to the nip standby position by the cam [2] of the intermediate roller open close motor (M25).
The home position of the intermediate roller /Up open/close operation is detected by the intermediate roller home sensor (PS33) [3].

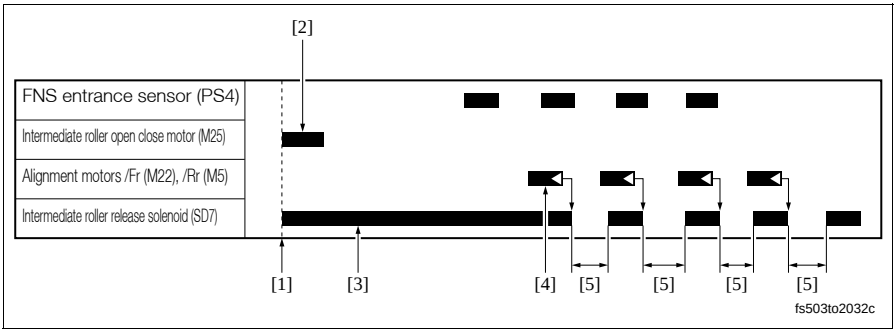


[1] Intermediate roller /Up
[2] Cam of the intermediate roller open close motor (M25)
[3] Intermediate roller home sensor (PS33)

While in the print operation, the pressure/release of the intermediate roller /Up [1] onto the intermediate roller /Lw [2] is made by the intermediate roller release solenoid (SD7) [3].
When paper is being conveyed to the stacker, SD7 turns ON to release the nip, and paper that passes through the opening between the intermediate roller /Up [1] and the intermediate roller /Lw [2] is conveyed to the stacker. When paper is being exited, SD7 turns OFF and the intermediate roller /Up [1] is pressed against the intermediate roller /Lw [2] by the pressure of the spring. The paper is nipped before being exited.



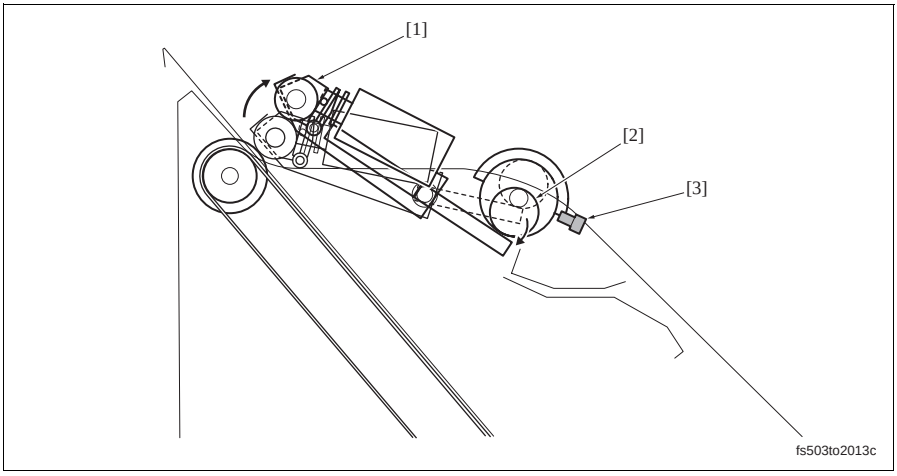
[1] Intermediate roller /Up
[2] Intermediate roller /Lw
[3] Intermediate roller release solenoid (SD7)
[4] Paper



[1] Start signal ON
[2] Movement of the intermediate roller /Up to the nip standby position
[3] Nip release of the intermediate roller /Up
[4] Alignment operation
[5] Paper nip by the intermediate rollers /Up and /Lw

B. Staple mode control

While in the staple mode operation, through the initial operation made when the start signal is turned ON, the intermediate roller /Up [1] is moved to the evacuation position by the eccentric cam [2] that is driven by the intermediate roller open close motor (M25).



[1] Intermediate roller /Up

[2] Eccentric cam

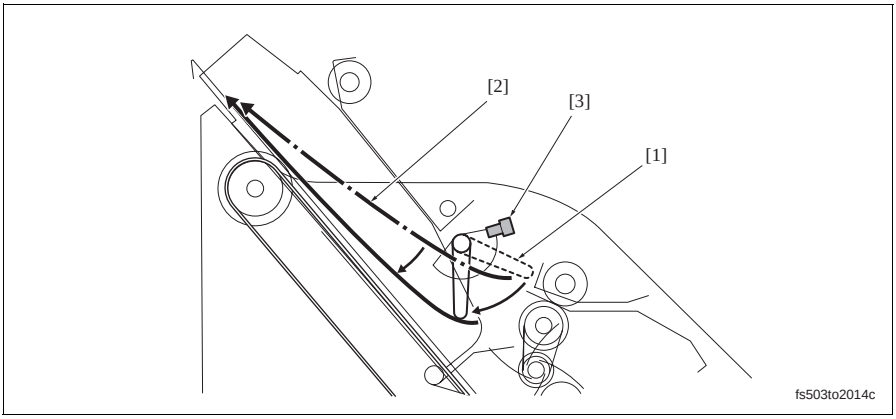
[3] Intermediate roller home sensor (PS33)

6.3.3 Stack assist control

The stack assist plate is a paper pressure plate that is used to increase the speed to put paper in the stacker for an increased productivity.

The stack assist plate [1] is driven by the stack assist motor (M24). When being conveyed to the stacker section, each sheet of paper is pressed at the position near the rear end of the paper [2] to be stacked at a speed faster than a free fall.

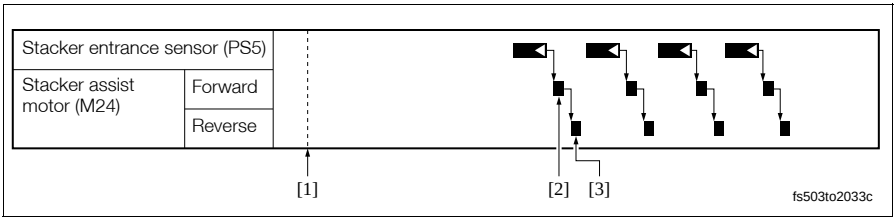
The stack assist plate is driven by 65° from the home position in the staple mode and by 80° in the shift and straight mode. The home position is detected by the stack assist home sensor (PS32) [3].



[1] Stack assist plate

[2] Paper

[3] Stack assist home sensor (PS32)



[1] Start signal ON

[2] Paper pressure by the stack assist plate

[3] Movement of the stack assist plate to the evacuation position

6.3.4 Rear stopper control

The rear stopper is a paper rear stopper when paper is exited in the non-staple (straight/sort) mode. This shortens the conveyance distance to the main tray for an improved productivity.

The rear stopper is driven and released by the rear stopper motor (M26) in the staple mode.

The set state in the non-staple mode (the position at which paper is stopped by the rear stopper) is the home position of the rear stopper and this is detected by the rear stopper home sensor (PS35).

6.3.5 Alignment control

A. Horizontal alignment

The horizontal alignment is made by the 2 alignment plates, that is, alignment plate /Fr and alignment plate /Rr. These 2 alignment plates are driven independently by each of the alignment motor /Fr (M22) and the alignment motor /Rr (M5).

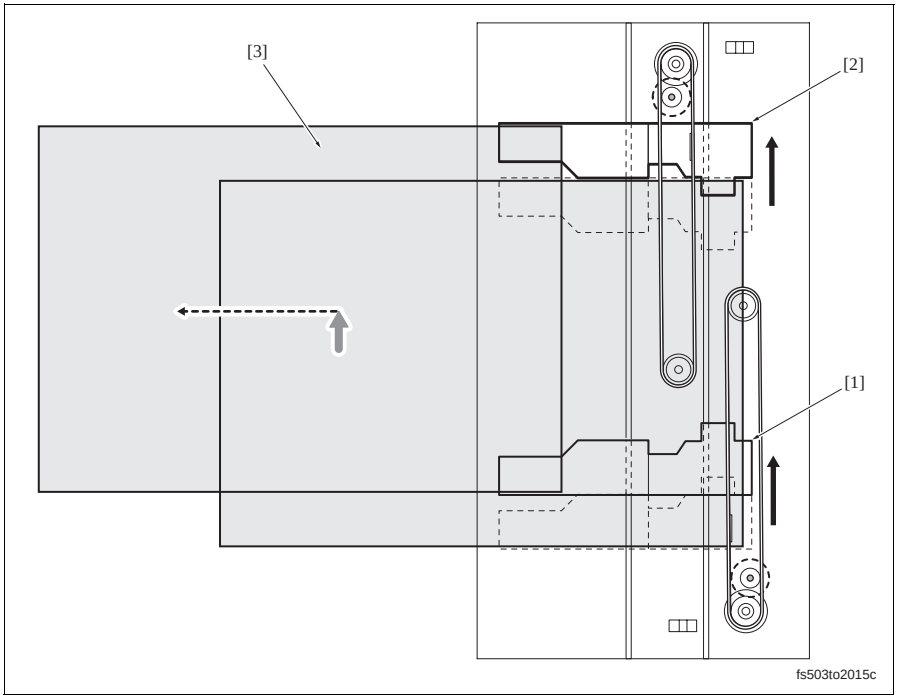
The home position of the alignment plate /Fr is detected by the alignment home sensor /Fr (PS31) and that of the alignment plate /Rr is detected by the alignment home sensor /Rr (PS8).

(1) Straight mode

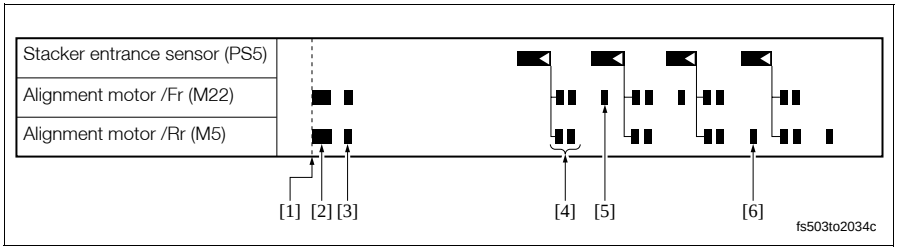
In the straight mode, each sheet of paper sent to the stacker is aligned by the alignment plate /Fr and the alignment plate /Rr before being exited to the straight position.

(2) Shift mode

In the shift mode, each time a sheet of paper is sent to the stacker, the alignment plate /Fr [1] and the alignment plate /Rr [2] shift to the rear to convey the paper [3] to the shift position before exiting it.



[1] Alignment plate /Fr
[2] Alignment plate /Rr
[3] Paper



[1] Start signal ON
[2] Home position search
[3] Movement to the size position
[4] Alignment operation for each sheet of paper
[5] Move the paper to the shift position in the rear
[6] Move the paper to the shift position in the front

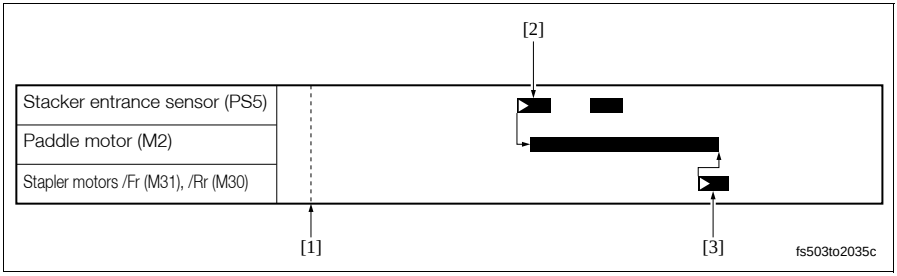
(3) Staple mode

In the staple mode, the alignment operation is made by the alignment plates /Fr and /Rr for each sheet of paper that has been sent to the stacker. After the last sheet of paper of the copy is conveyed to the stacker section, the alignment operation for the staple is made for stapling.

B. Vertical alignment

In the staple mode, for the vertical alignment of paper, the paper is pushed against the flat-stapling stopper by the paddle that is driven by the paddle motor (M2).

The vertical alignment is assisted by the swing roller that is interlocked with the paddle by M2.



[1] Start sinal ON

[2] Stapling of the 1st sheet of paper

[3] Stapling

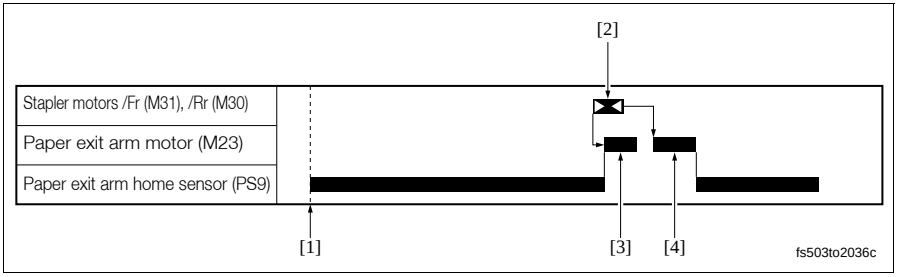
6.3.6 Stacker paper exit

A. Non-staple control

In the non-staple mode, the paper exit is made by the nip of the intermediate rollers /Up and /Lw.

B. Staple control

In the staple mode, the paper exit is made by the paper exit arm that is driven by the paper exit arm motor (M23). The home position of the paper exit arm is detected by the paper exit arm home sensor (PS9).



[1] Start signal ON

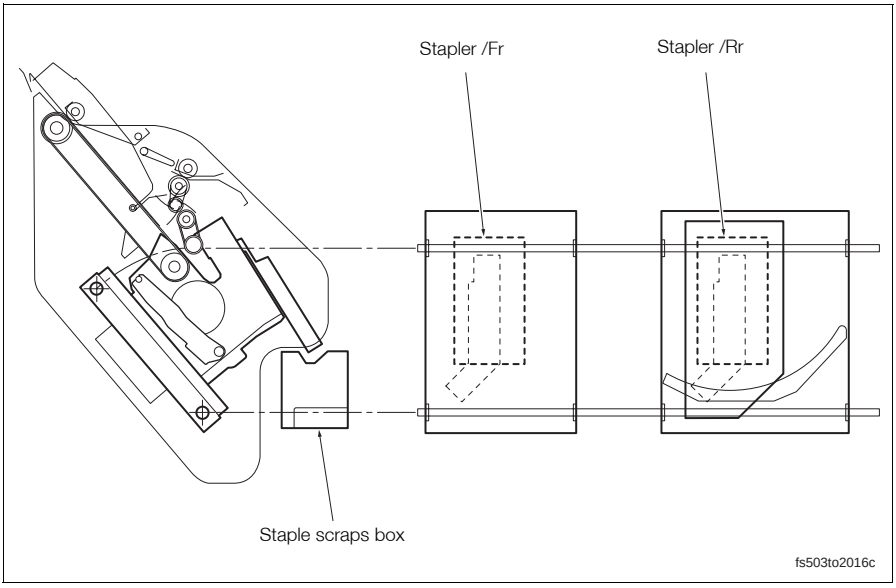
[2] Stapling

[3] Movement to the paper exit arm standby position

[4] Paper exit operation of paper bundle

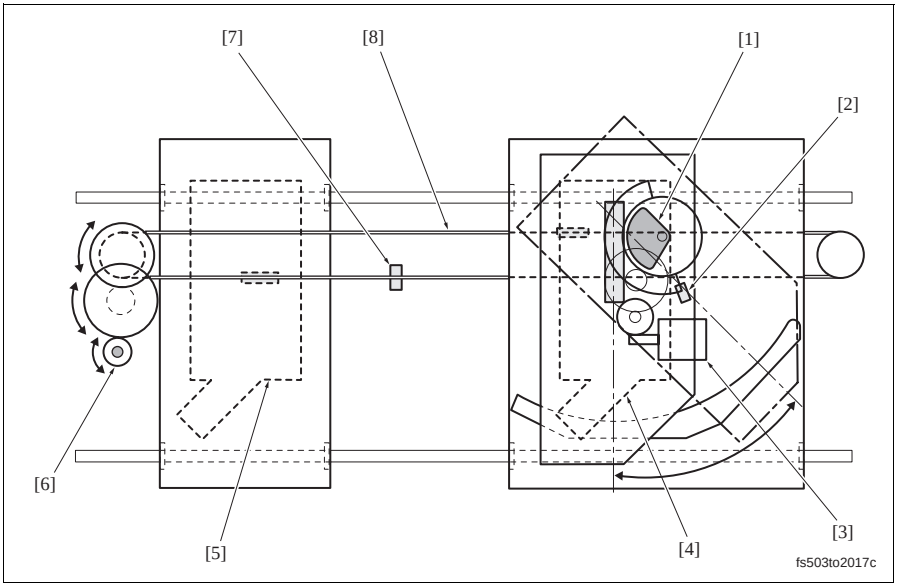
7. STAPLER SECTION

⚠ 7.1 Composition



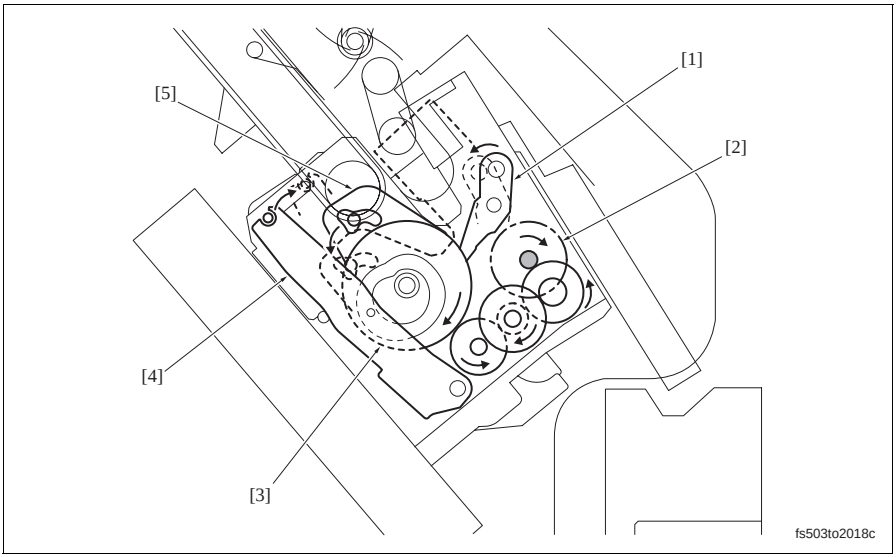
7.2 Drive

7.2.1 Stapler movement/rotation



[1] Cam
[2] Stapler rotation home sensor (PS14)
[3] Stapler rotation motor (M4)
[4] Stapler /Rr
[5] Stapler /Fr
[6] Stapler movement motor (M11)
[7] Stapler movement home sensor (PS11)
[8] Belt

7.2.2 Stapler



[1] Staple cut/bending arm
[2] Stapler motors /Rr (M30), /Fr (M31)
[3] Eccentric cam
[4] Stapling arm
[5] Pressure plate

7.3 Operation

7.3.1 Stapler movement control

For stapler movements, there are two types, that is, the horizontal movement of the stapler intervals and the rotation of the stapler /Rr. Movement is made according to the staple mode.

The horizontal movement of the stapler is made by the stapler movement motor (M11). The stapler /Rr and the stapler /Fr are fixed on the upper side and the lower side of a belt that forms a loop and moved respectively in the opposite direction by the motor M11.

The home position of the horizontal movement is detected by the stapler movement home sensor (PS11).

The 45° rotational movement of the stapler /Rr for the one-corner stapling at rear is made by the stapler rotation motor (M4).

The home position of the rotational movement is detected by the stapler rotation home sensor (PS14).

A. 1 staple

(1) 1 staple/at front

When the start signal is turned ON, the stapler movement motor (M11) also turns ON to move the stapler to the position according to the paper size.

(2) Size movement in 1 staple/one-corner stapling at rear

When the start signal is turned ON, the stapler movement motor (M11) turns ON to move the stapler to the position according to the paper size. After a specified period of time, the stapler rotation motor (M4) also turns ON to rotate the stapler /Rr and move it diagonally.

When a staple empty condition of the stapler /Rr is detected at the one-corner stapling at rear, M4 is driven to replace the cartridge and the stapler is returned to its vertical position.

B. 2 staples

When the start signal is turned ON, the stapler movement motor (M11) also turns ON to move the stapler to the position according to the paper size.

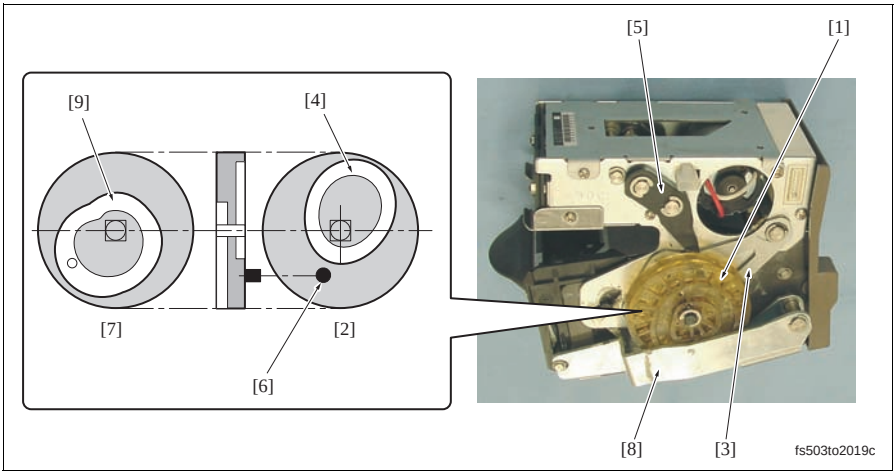
7.3.2 Staple control

The staple control is made by the stapler motors /Rr (M30) and /Fr (M31) to drive the eccentric cam.

The inside [2] of the eccentric cam [1] is provided with the cam groove [4] of the pressure arm [3] and the pin [6] of the staple cut/clinch arm [5]. The outside [7] of the eccentric cam is also provided with the cam groove [9] of the stapling arm [8].

Each time the eccentric cam makes a 1/4 turn, each of the following operations is made: 1. paper pressure, 2. stapling, 3. staple cut/clinch, and 4. return to the home position. A series of the operations complete in a full turn.

The home position is detected by the stapler home sensors /Rr (PS40), /Fr (PS41).



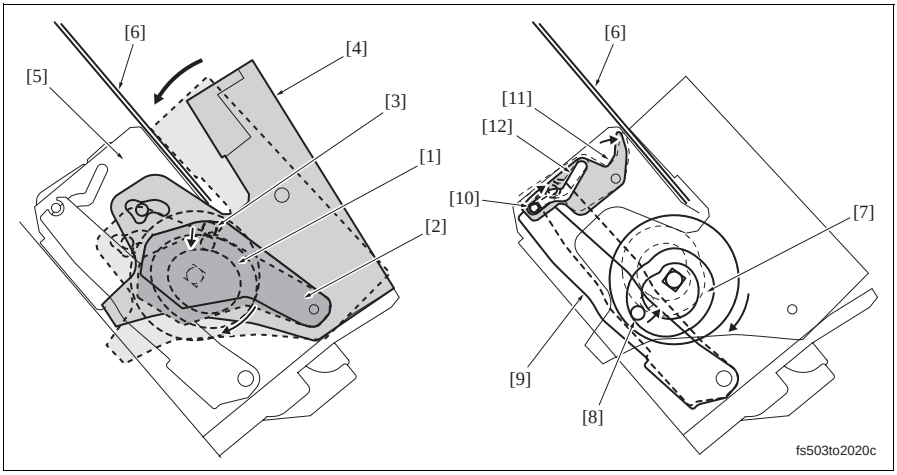
[1] Eccentric cam
[2] Inside
[3] Pressure arm
[4] Cam groove (for pressure arm)
[5] Staple cut/clinch arm
[6] Pin (for staple cut/clinch)
[7] Outside
[8] Stapling arm
[9] Cam groove (for stapling arm)

A. Paper pressure

When the eccentric cam rotates 90° from the home position, the cam groove [1] on the inside drives the pin [3] provided on the pressure arm [2] in the arrow-marked direction. The pressure arm [2] drives the pressure plate [4] and presses the clinch side hard against the staple side [5] to press the paper [6].

At the same time, the pin [8] provided in the groove [7] on the outside of the cam drives the stapling arm [9]. The pin [10] at the tip of the stapling arm moves along the groove [12] of the pressure claw [11], and drives the pressure claw [11] with the lever to press the paper.

The following figure left shows a cam on the outside and the figure right shows a cam on the inside.

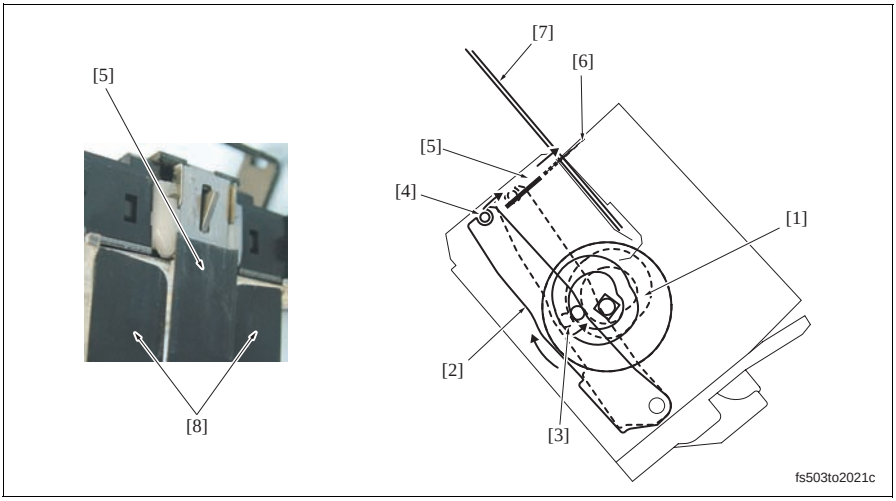


[1] Cam groove
[2] Pressure arm
[3] Pin
[4] Pressure plate
[5] Staple side
[6] Paper
[7] Cam groove (for stapling arm)
[8] Pin
[9] Stapling arm
[10] Pin
[11] Pressure claw
[12] Groove

B. Stapling control

When the eccentric cam rotates from 90° to 180°, the cam groove [1] on the outside drives the pin [3] provided on the stapling arm [2] in the arrow-marked direction. The pin at the tip [4] of the stapling arm pushes up the stapling blade [5] to push out the staple [6], punch out the paper [7] and staple it.

At the same time, to make preparation for the next stapling, the staple is bent at 90° by the staple bending blade [8].



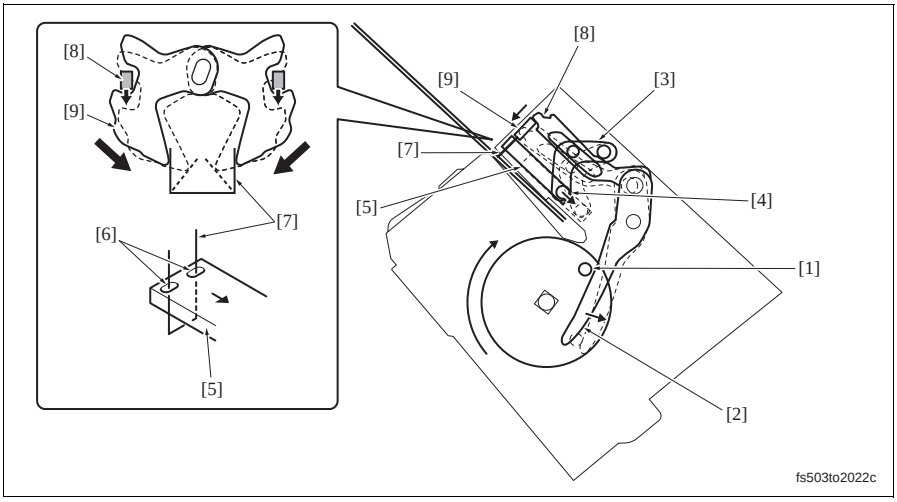
[1] Cam groove
[2] Stapling arm
[3] Pin
[4] Pin at the tip
[5] Stapling blade
[6] Staple
[7] Paper
[8] Staple bending blade

C. Staple cut/clinch control

When the eccentric cam rotates from 180° to 270°, the pin [1] provided on the inside drives the staple cut/clinch arm [2] in the arrow-marked direction.

At the start of rotation, the lever operation of the staple cut/clinch arm [2] rotates the coupling metal fitting [3] to pull the pin [4] in the arrow-marked direction and the staple [7] inserted into the round hole [6] of the staple cut blade [5] is cut. Staple scraps that have been cut drop into the duct to be collected in the staple scraps box.

With the further rotation of the eccentric cam, the tip of the presser metal fitting [8] that is interlocked with the staple cut/clinch arm [2] pushes down the clinch metal fitting [9] to clinch the staple [7] that has been cut. When the eccentric cam rotates up to 270°, the clinch operation is completed. After completion of clinching, the eccentric cam rotates to the home position to complete a series of operations.



[1] Pin
[2] Staple cut/clinch arm
[3] Coupling metal fitting
[4] Pin
[5] Staple cut blade
[6] Round hole
[7] Staple
[8] Presser metal fitting
[9] Clinch metal fitting

D. Cartridge detection

The presence of a cartridge or the incorrect setting of a cartridge is detected by the cartridge set sensors /Rr (PS42), /Fr (PS43). When there is no cartridge or the cartridge is set incorrectly, an error message is displayed on the operation section.

E. Staple detection

When the staples run short, the staple empty sensors /Rr (PS44), /Fr (PS45) detect this condition and display an error message on the operation section.

F. Staple tip detection

The tip of the staple is detected by the staple ready sensors /Rr (PS46), /Fr (PS47).

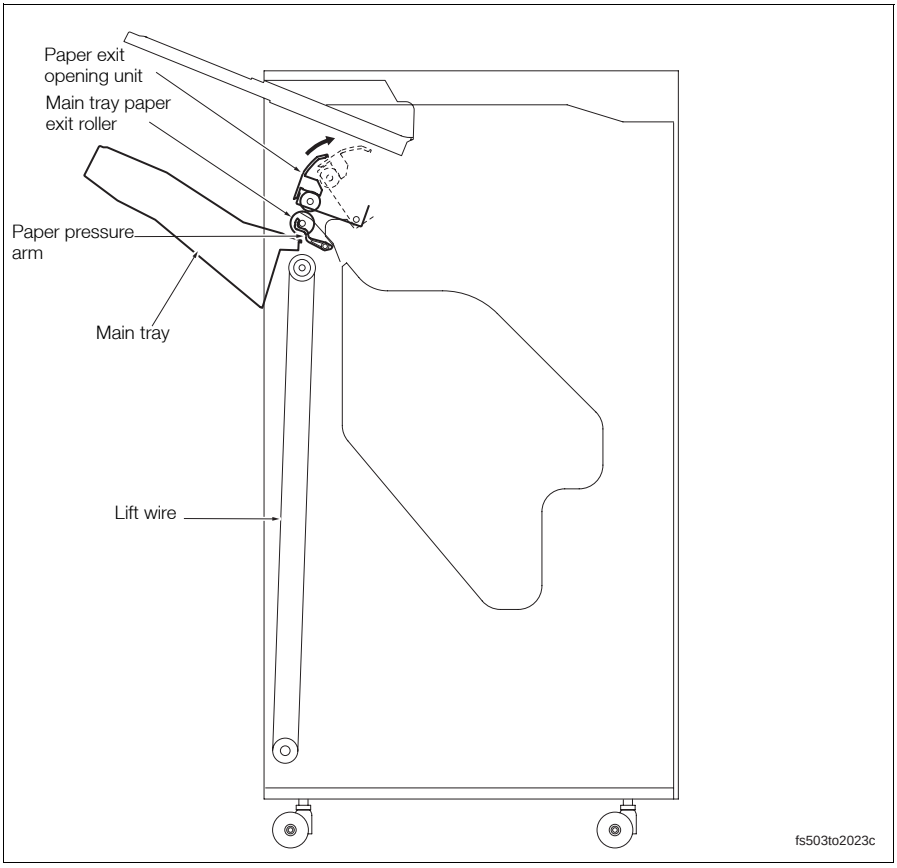
While in the stapling operation, the staple ready sensors determine that the staples have been clogged when the PS46 and PS47 do not turn on within a specified period of time after the staple home sensors /Rr (PS 40), /Fr (PS41) turn off, and rotate the stapler motors /Rr (M30), /Fr (M31) in the reverse direction up to the home position.

G. Staple scraps box detection

The presence of a staple scraps box or the incorrect setting of a box is detected by the stapler scraps box set sensor (PS34). When there is no staple scraps box or it is set incorrectly, an error message is displayed on the operation section.

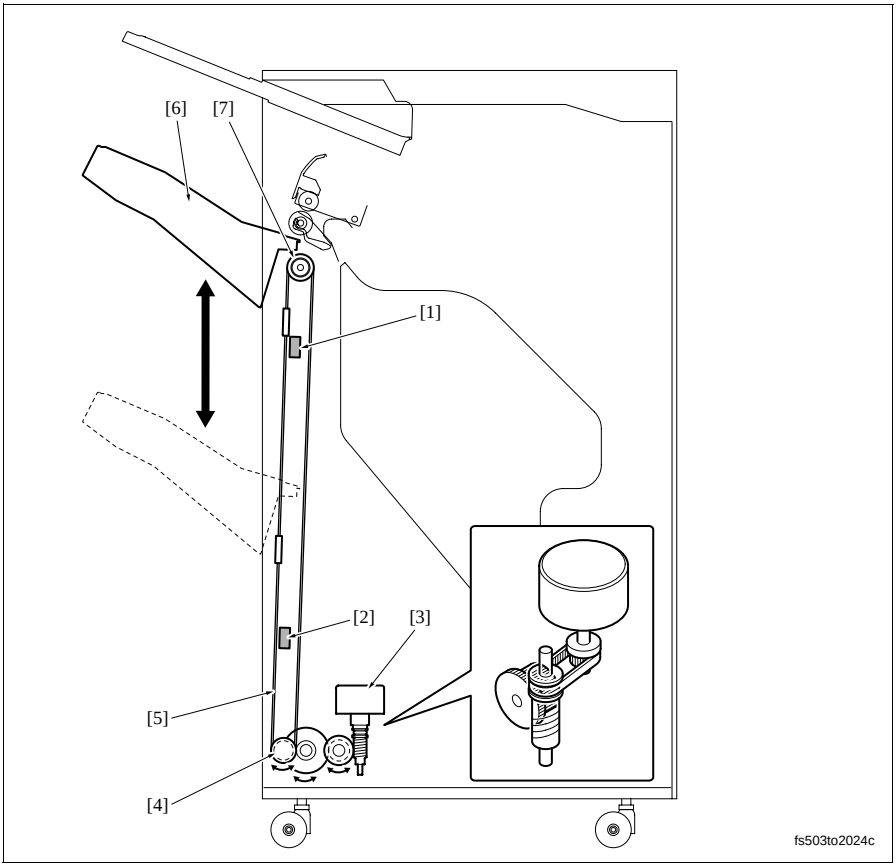
8. MAIN TRAY SECTION

⚠ 8.1 Composition



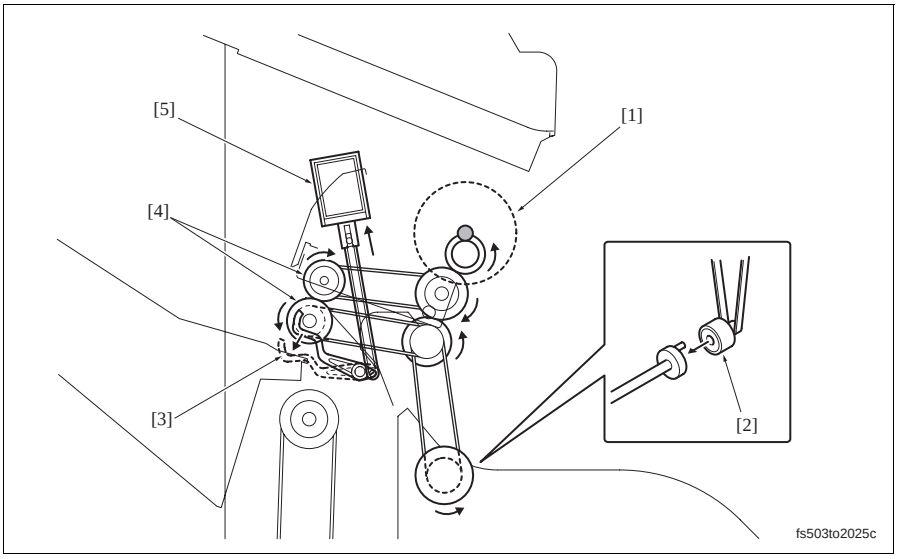
8.2 Drive

8.2.1 Tray up/down drive



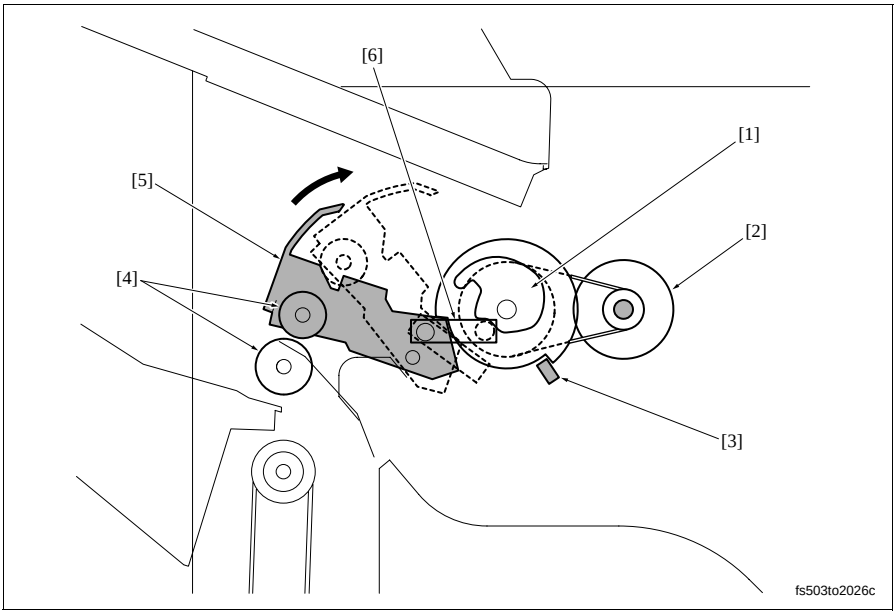
[1] Counter reset sensor (PS15)
[2] Tray lower limit sensor (PS3)
[3] Tray up down motor (M3)
[4] Lift pulley /Lw
[5] Lift wire
[6] Main tray
[7] Lift pulley /Up

8.2.2 Main tray paper exit drive



[1] Main tray paper exit motor (M7)
[2] Coupling
[3] Paper pressure arm
[4] Main tray paper exit roller
[5] Paper exit opening solenoid (SD9)

8.2.3 Paper exit opening drive



[1] Cam
[2] Paper exit opening motor (M8)
[3] Paper exit opening home sensor (PS12)
[4] Main tray paper exit roller
[5] Paper exit opening unit
[6] Drive bar

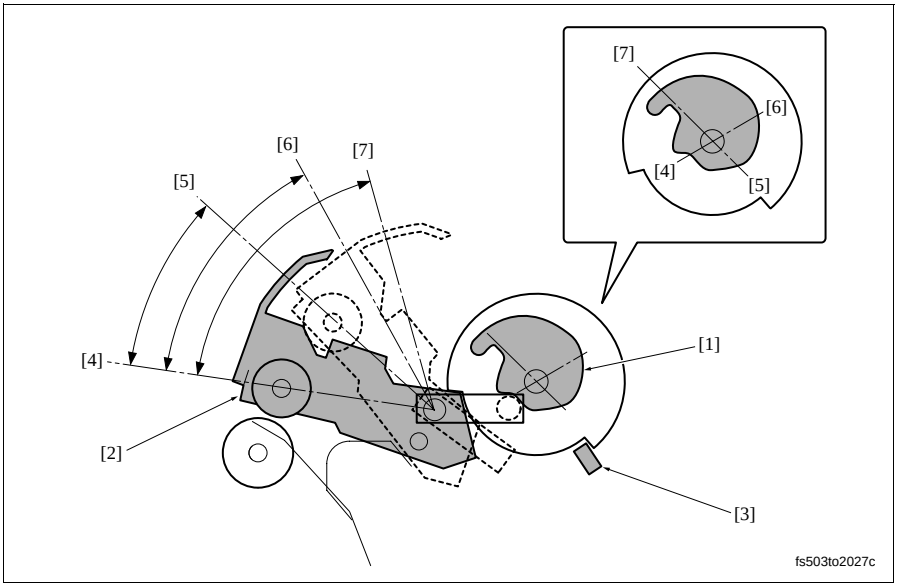
8.3 Operation

8.3.1 Paper exit opening control

When paper is too long and protruding, the paper exit opening is opened and closed for alignment.
There are 3 opening positions available according to the mode and the paper length.
For paper shorter than the following length, the paper exit opening is opened neither in the non-staple mode nor the staple mode.

Mode	Angle of the opening	Paper length in the sub scan direction
Non-staple	Approx. 27°	More than 239 mm
Staple	Approx. 44°	More than 400 mm
Staple	Approx. 55°	More than 219 mm, less than 400 mm

For the open/close of the paper exit opening, the paper exit motor (M8) rotates and the deformed cam [1] lifts up the entire paper exit opening unit [2] to open the paper exit opening. The open/close of the paper exit opening is detected by the paper exit opening home sensor (PS12) [3].



[1] Deformed cam
[2] Paper exit opening unit
[3] Paper exit opening home sensor (PS12)
[4] Position at 0°
[5] Position at 27°
[6] Position at 44°
[7] Position at 55°

A. Non-staple control

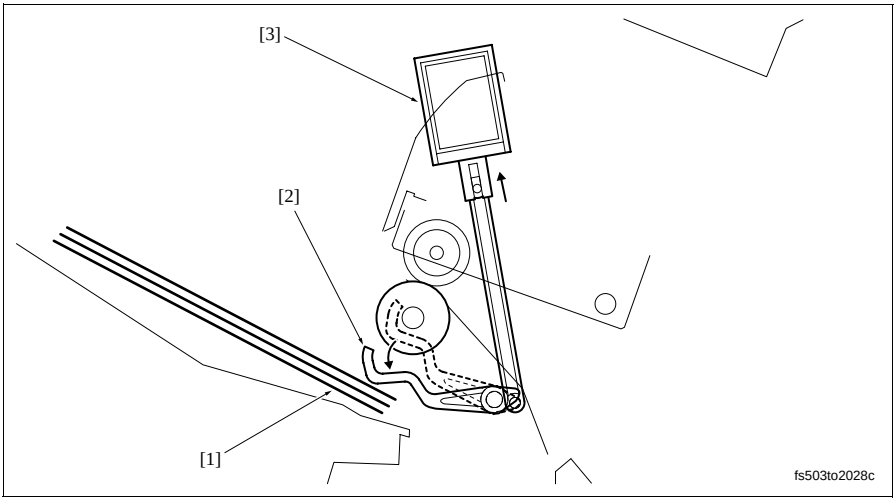
When the paper length is less than 239 mm, paper exit unit is not opened.
When the paper length is 239 mm or longer, paper exit unit is opened by 27°.
Turn ON the start signal while in the M8 open the paper exit unit to about 27°. Close the paper exit unit after the alignment.

B. Staple control

When the paper length is less than 219 mm, paper exit unit is not opened.
When the paper length is 219 mm or longer and less than 400 mm, paper exit unit is opened by 55°.
When the paper length is 400 mm or longer, paper exit unit is opened by 44°.
Open angle is narrow for 400 mm or longer due to the differences of the number of stapled pages.
# of stapled pages:Less than 400 mm 100 pages
400 mm or longer 50 pages

C. Sub-set staple control

Sub set staple control avoids exited papers misalignment when sub set staple is used.
Paper holding arm is driven by paper exit solenoid (SD9).
When stapled sheets of paper are exited, paper holding arm presses previously exited sheets since they are misaligned by staples.
When exiting sheets without staple, paper holding arm does not operate.
As control timing, SD9 is turned ON by staple operation.
In predetermined time after stapled sheets go through stacker empty sensor (PS20), SD9 is turned OFF.
The timing of turning OFF SD9 is when 2/3 of stapled sheets are exited.



[1] Paper
[2] Paper presser arm
[3] Paper exit opening solenoid (SD9)

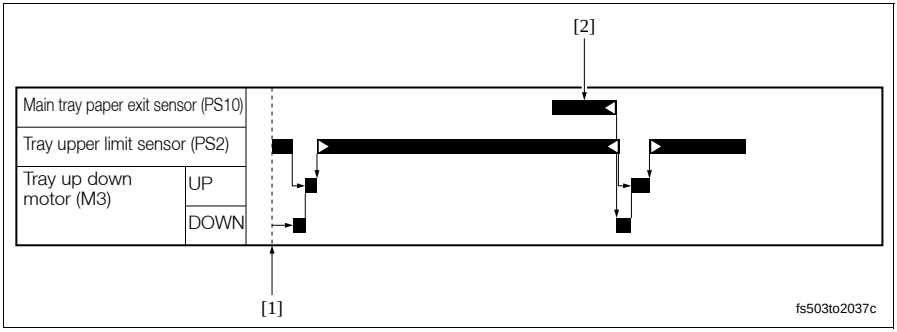
8.3.2 Main tray up/down control

The driving force of the tray up down motor (M3) rotates the lift pulley by the belt and the gear to wind up the lift wire. The main tray goes up or down according to the direction in which the up/down wire is wound up. When the lift pulley /Lw rotates clockwise as seen from the front, the main tray goes up and when it rotates counter-clockwise, the tray goes down.

A. Non-staple up/down control

According to the FS operation signal from the main body, the tray up down motor (M3) raises the tray until the tray upper limit sensor (PS2) turns ON.

When paper passes through the main tray paper exit sensor (PS10), M3 lets down the tray. M3 raises up the tray again a specified period of time after PS2 turns OFF and stops it when PS2 turns ON. The above steps are repeated for each sheet of paper.

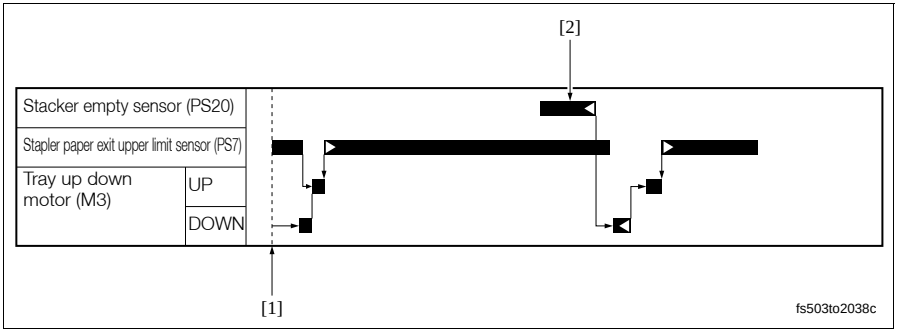


[1] Start signal ON

[2] Paper exited

B. Staple control

When the stacker empty sensor (PS20) detects the trailing edge of paper, the main tray is brought down by the tray up down motor (M3). And M3 reverses the rotation after a specified period of time to bright up the tray. It stops when the stapler paper exit upper limit sensor (PS7) turns ON.



[1] Start signal ON

[2] Paper bundle exited

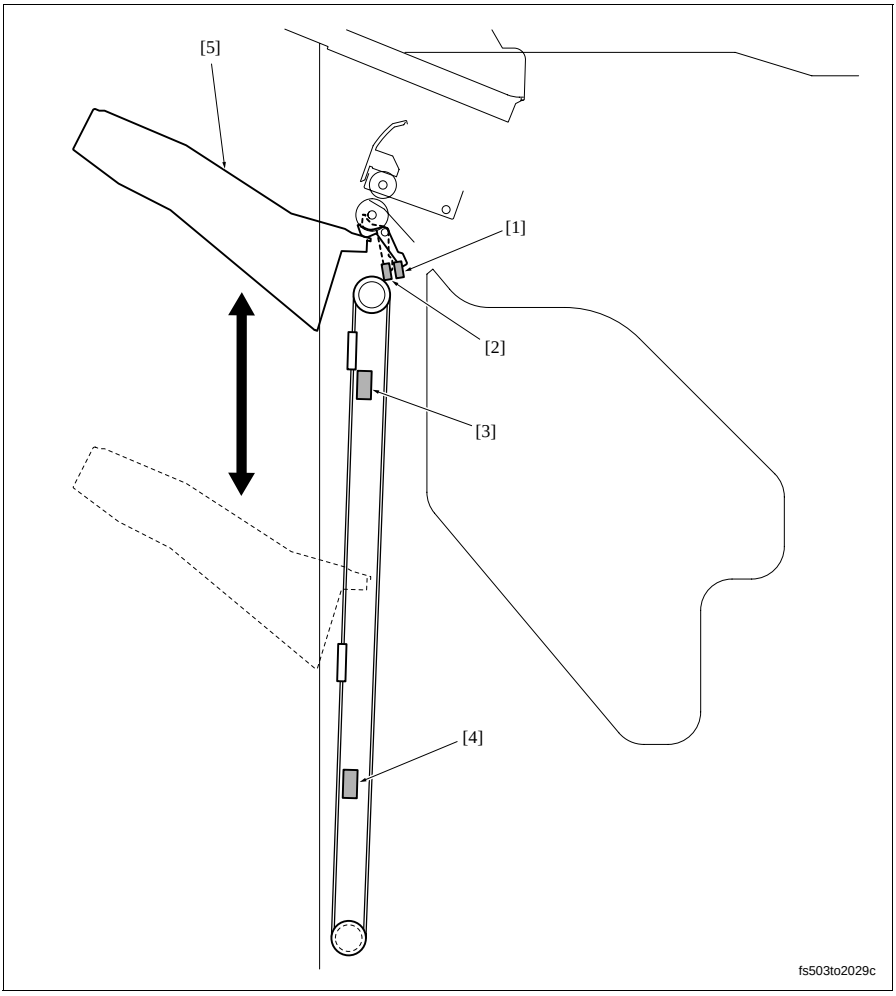
C. Main tray paper detection

The tray upper limit sensor (PS2) and the stapler paper exit upper limit sensor (PS7) maintain the distance between the upper surface of the paper exited in the main tray (or the main tray upper surface when no paper is exited) and the paper exit opening at a specified distance to prevent any uneven paper exit from occurring.

While in the continuous print mode, the FS uses a software to count the number of sheets of paper exited and stops printing when the count reaches the maximum number of sheets loadable for each paper size.

However, when paper has been exited is removed while in printing, the tray goes up to turn ON the counter reset sensor (PS15). This resets the software counter, thus allowing paper to be exited without limit.

The tray lower limit sensor (PS3) detects the lowest limit of the tray. In the intermittent print mode, the total number is not added up by the software counter and the PS3 is used to restrict the number of sheets of paper.



[1] Stapler paper exit upper limit sensor (PS7)
[2] Tray upper limit sensor (PS2)
[3] Counter reset sensor (PS15)
[4] Tray lower limit sensor (PS3)
[5] Main tray

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KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

FS-607

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show to the left of the revised section.
  A number within represents the number of times the revision has been made.

- To indicate clearly a section revised, show in the lower outside section of the corresponding page.
  A number within represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

2006/09	1.0	—	Issue of the first edition
Date	Service manual Ver.	Revision mark	Descriptions of revision

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	Multi folding multi stapling device

B. Functions

(1) Functions

Non-sort mode	Exited to the main tray with no processing made.
Sort/group mode	Exited to the main tray after being shifted for every copy.
Sub tray mode	Exited to the sub tray with no processing made.
Stapling mode	Exited to the main tray after being stapled.
Saddle stitching mode	Exited to the booklet tray with the paper folded into two after being stitched and folded at the center of the paper.
Folding mode	Exited to the booklet tray with the paper folded into two at its center.
Tri-folding mode	Exited to the booklet tray after being overlapped up to 3 sheets and being tri-folded.

(2) Stapling

Max. flat-stapling capacity	50 sheets of 64 to 80 g/m^2 (plain paper, high-quality paper),30 sheets (color paper, coated paper) 30 sheets of 81 to 105 g/m^2 (plain paper, high-quality paper),16 sheets (color paper, coated paper) Up to 2 sheets of 200g/m2 can be added unless the total number of sheets exceeds the above capacity.	
	staple position	Front parallel / back 45° 1 position diagonally, 2 positions at the center
Max. saddle stitching capacity	20 sheets of 64 to 80 g/m^2 20 sheets of 81 to 105 g/m^2 (Plain paper, high-quality paper), 16 sheets (color paper, coated paper) Up to 2 sheets of 200g/m2 can be added unless the total number of sheets exceeds the above capacity.	
	staple position	variable (128 to 168mm)

(3) Folding

Max.Folding	3 sheets of 64 to 105 g/m^2 paper
Max.Tri-folding	3 sheets of 64 to 80 g/m^2 paper 1 sheet of 81 to 105 g/m^2 paper

(4) Max. paper capacity

<table>
<tr><td rowspan="8">Main tray
(Weighing 80g/m^2)</td><td rowspan="8">Non-sort mode,
sort/group mode</td><td colspan="3">2500 sheets: A4, A4S, B5, B5S
8½ x 11, 8½ x 11S
16K, 16KS
1500 sheets: A3, B4, SRA4S,
12 x 18, 11 x 17, 8½ x 14,
8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13
8K
500 sheets: A5, A5S *1, B6S *1
5½ x 8½S *1
Tab paper*3 : A4, 8½ x 11
Custom paper : Max. 314 x 458mm, Min.*2 182 x 148 mm</td></tr>
<tr><td rowspan="7">Stapling mode</td><td colspan="3">Max. 1000 sheets</td></tr>
<tr><td>No. of sheets per stapling</td><td>Size in the sub scan direction is 418mm or longer</td><td>The others</td></tr>
<tr><td>2 to 9</td><td>50 copies</td><td>100 copies</td></tr>
<tr><td>10 to 20</td><td>50 copies</td><td>50 copies</td></tr>
<tr><td>21 to 30</td><td>30 copies</td><td>30 copies</td></tr>
<tr><td>31 to 40</td><td>25 copies</td><td>25 copies</td></tr>
<tr><td>41 to 50</td><td>20 copies</td><td>20 copies</td></tr>
<tr><td rowspan="3">Booklet tray
(Weighing 80g/m^2)</td><td>Saddle stitching mode</td><td colspan="3">Size in the sub scan direction is 299 mm or longer : 15 copies in 5 sheets of saddle stitching
other than the above : 20 copies in 5 sheets of saddle stitching</td></tr>
<tr><td>Folding mode</td><td colspan="3">Size in the sub scan direction is 299 mm or longer : 25 copies in 3 sheets of folding
other than the above : 33 copies in 3 sheets of folding</td></tr>
<tr><td>Tri-folding mode</td><td colspan="3">50 copies in 1 sheet of folding</td></tr>
<tr><td>Sub tray
(Weighing 80g/m^2)</td><td colspan="4">100 sheets : SRA3, A3, B4, SRA4, SRA4S, A4, A4S, B5, B5S, A5, A5S, B6S, A6S
13 x 19, 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S
8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13
8K, 16K, 16KS
Tab paper*3 : A4, 8½ x 11
Custom paper : Max. 330 x 487mm, Min. 100 x 148 mm</td></tr>
</table>

*1 Non-sort mode only

*2 Non-sort mode is 128 x 148 mm

*3 Operation of paper exit with tab area at the trail edge side is not assured.

C. Type of paper

(1) Stapling mode

Paper size	A3, B4, SRA4S, A4, A4S, B5, B5S, A5 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS Tab paper*1 (A4, 8½ x 11) Custom paper (Max. 314 x 458 mm, Min. 182 x 148 mm)
Applicable paper	Plain paper, high-quality paper, color paper, coated paper (same as the main body)
Paper weight	64 to 105 g/m^2

*1 Operation of paper exit with tab area at the trail edge side is not assured.

(2) Saddle stitching mode

Paper size	A3, B4, SRA4S, A4S 12 x 18, 11 x 17, 8½ x 14, 8½ x 11S 8K Custom paper (Max. 314 x 458 mm, Min. 210 x 280 mm)
Applicable paper	Plain paper, high-quality paper, color paper, coated paper
Paper weight	64 to 105 g/m^2

(3) Folding mode

Paper size	SRA3, A3, B4, SRA4S, A4S 12 x 18, 11 x 17, 8½ x14, 8½ x11S, 8K Custom paper (Max. 314 x 458 mm, Min. 210 x 280 mm)
Applicable paper	Plain paper, high-quality paper, color paper, coated paper
Paper weight	64 to 105 g/m^2

(4) Tri-folding mode

Paper size	A4S 8½ x11S
Applicable paper	Plain paper, high-quality paper, color paper, coated paper
Paper weight	64 to 105 g/m^2

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	24/5VDC (supplied from the main body)
Maximum power consumption	80W or less
Dimensions	When the main tray is pulled out: 790.5 (W) x 656 (D) x 990 (H) mm When the main tray is set in: 674.5 (W) x 656 (D) x 990 (H) mm
Weight	Approx. 65 kg

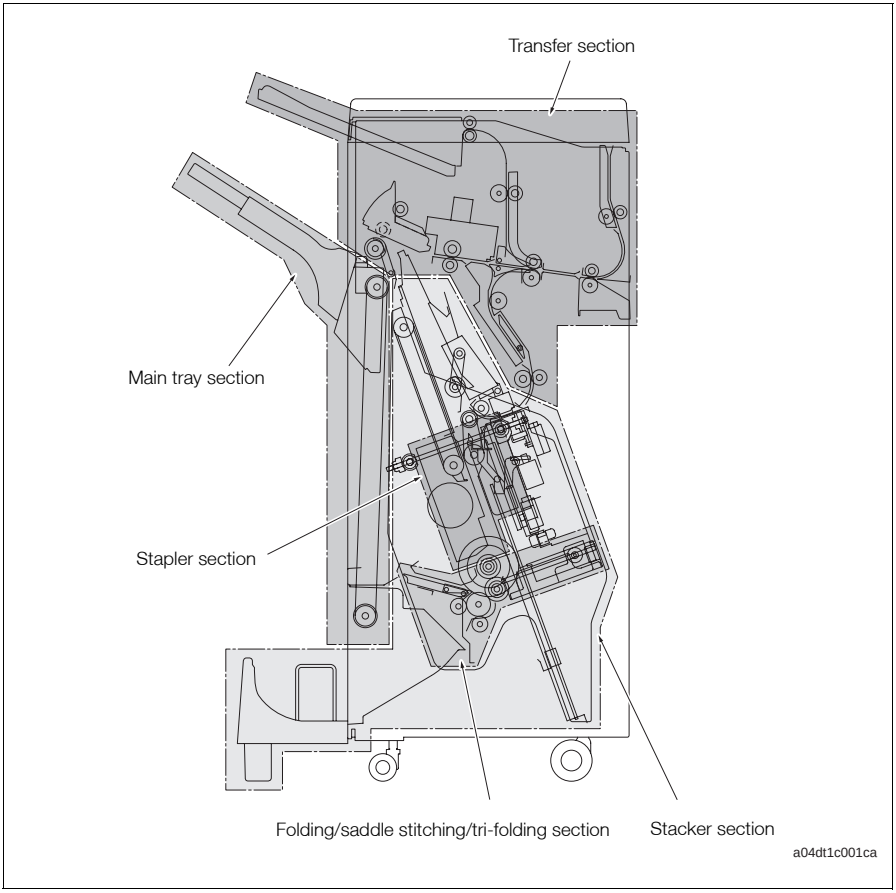
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

Note

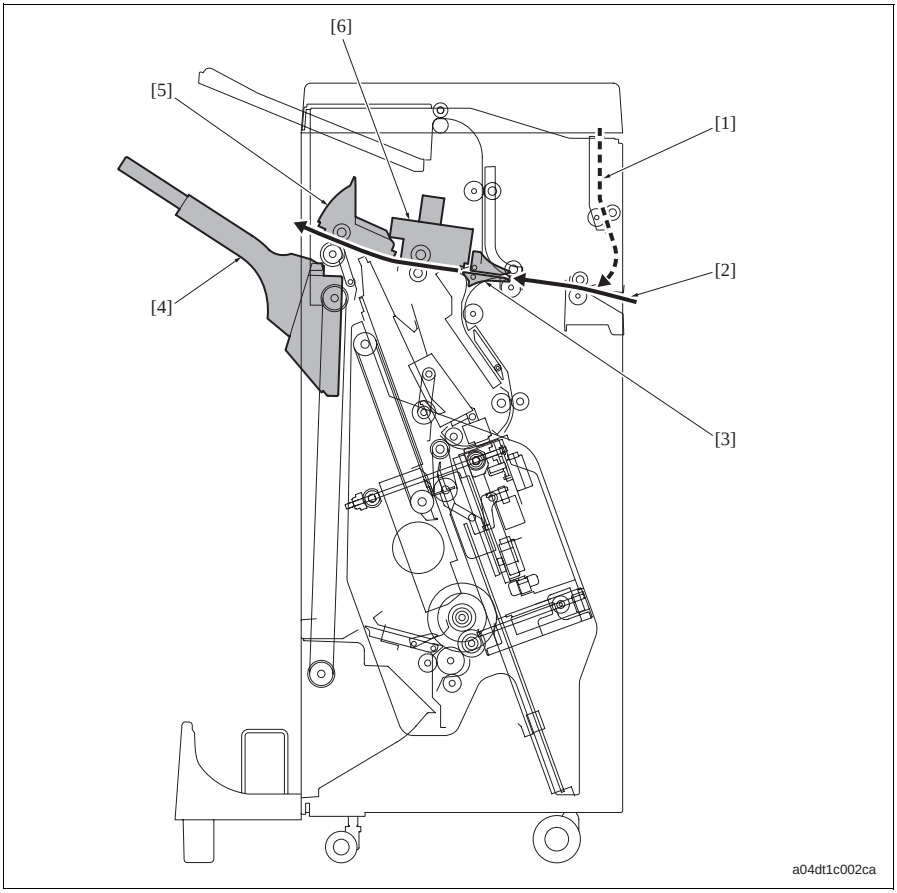
- **The information herein may be subject to change for improvement without notice.**

2. UNIT CONFIGURATION



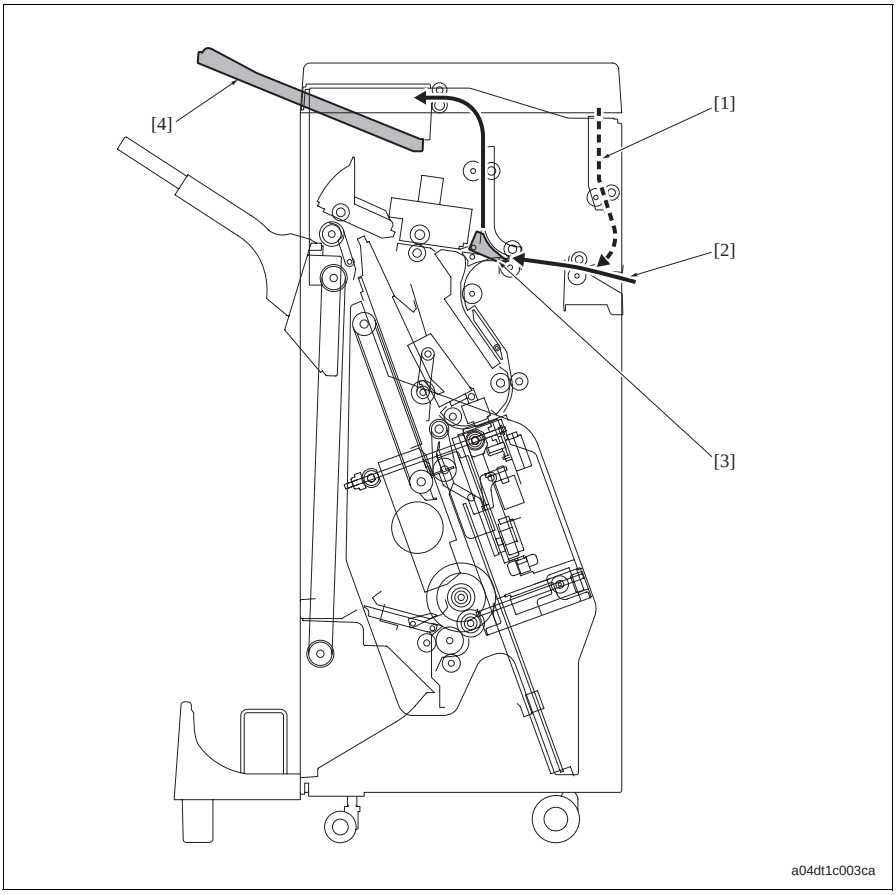
3. PAPER PATH

3.1 Non-sort/sort/group mode



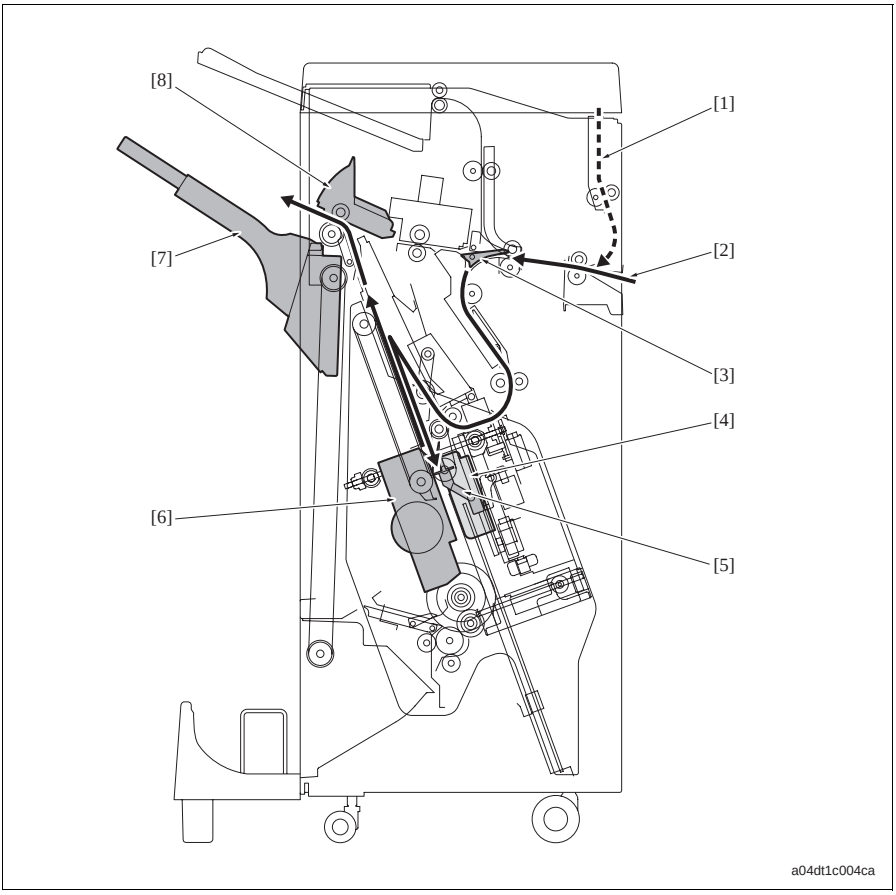
[1] Paper path from PI (PI-502 installed)
[2] Paper path from the main body
[3] Gate
[4] Main tray
[5] Paper exit unit
[6] Shift unit (sort/group mode only)

3.2 Sub tray mode



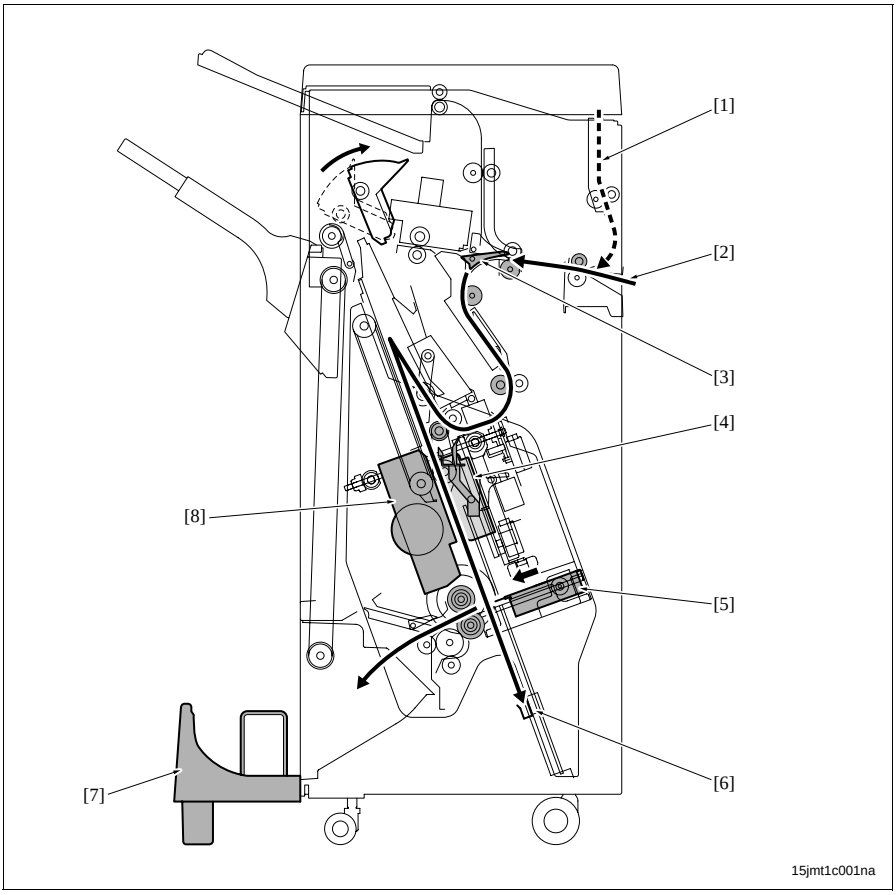
[1] Paper path from PI (PI-502 installed)
[2] Paper path from the main body
[3] Gate
[4] Sub tray

3.3 Stapling mode



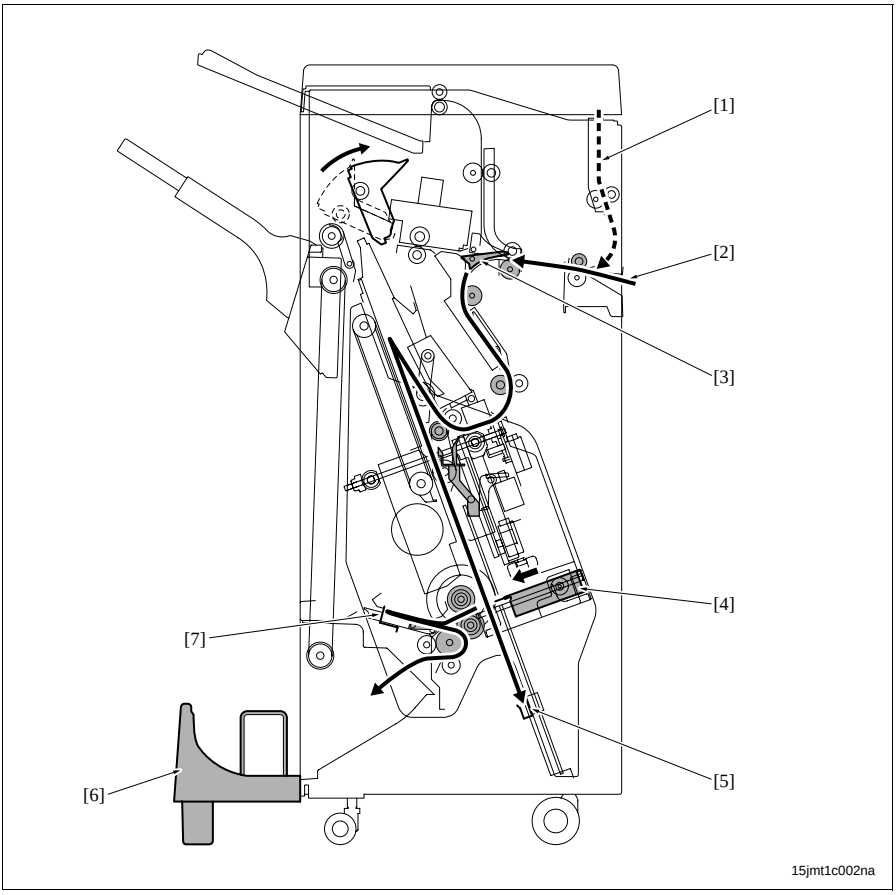
[1] Paper path from PI (PI-502 installed)
[2] Paper path from the main body
[3] Gate
[4] Clincher
[5] Flat-stapling stopper
[6] Stapler
[7] Main tray
[8] Paper exit unit

3.4 Folding/saddle stitching mode



[1] Paper path from PI (PI-502 installed)
[2] Paper path from the main body
[3] Gate
[4] Clincher
[5] Folding knife
[6] Saddle stitching stopper
[7] Booklet tray
[8] Stapler

3.5 Tri-folding mode

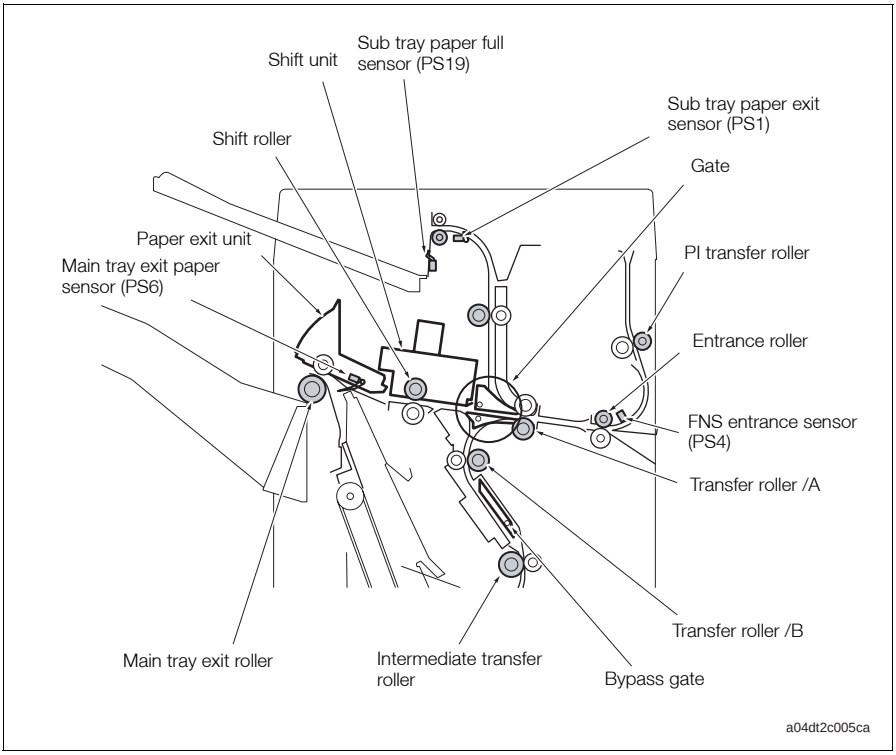


[1] Paper path from PI (PI-502 installed)
[2] Paper path from the main body
[3] Gate
[4] Folding knife
[5] Saddle stitching stopper
[6] Booklet tray
[7] Tri-folding stopper

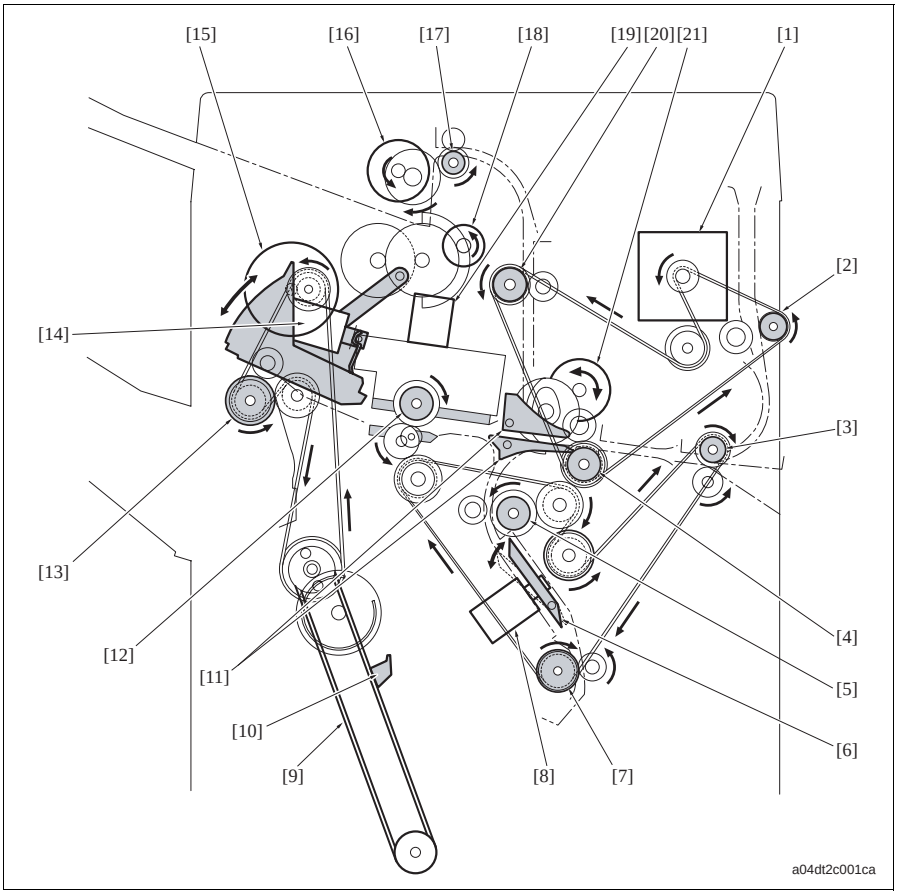
■ COMPOSITION/OPERATION

4. TRANSFER SECTION

4.1 Composition



4.2 Drive

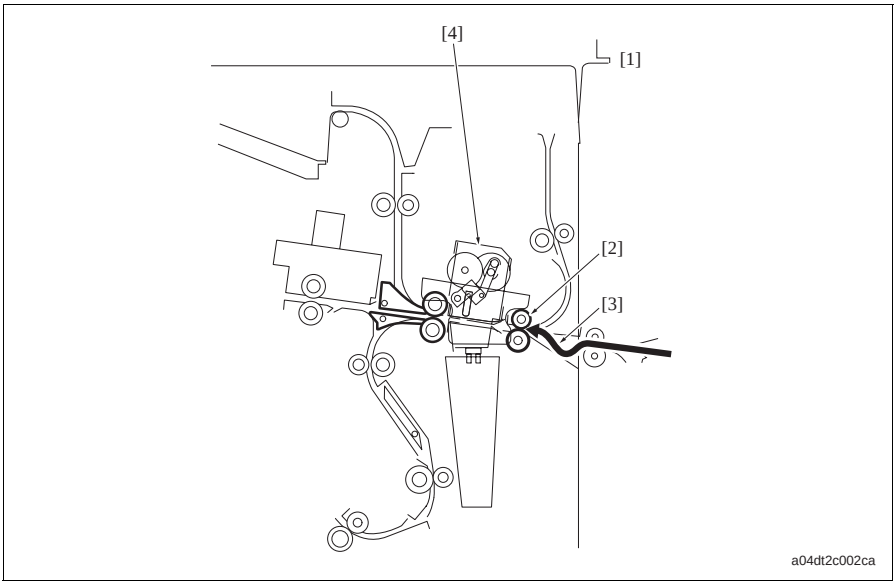


[1] FNS transfer motor (M1)
[2] PI transfer roller
[3] Entrance roller
[4] Transfer roller /A
[5] Transfer roller /B
[6] Bypass gate
[7] Intermediate transfer roller
[8] Bypass gate solenoid (SD5)
[9] Paper exit belt
[10] Paper exit arm
[11] Gate
[12] Shift roller
[13] Main tray exit roller
[14] Paper exit opening solenoid (SD4)
[15] Paper exit roller motor (M7)
[16] Sub tray paper exit motor (M21)
[17] Sub tray paper exit roller
[18] Paper exit motor (M8)
[19] Shift roller motor (M2)
[20] Sub tray transfer roller
[21] Gate motor (M12)

4.3 Operation

4.3.1 Punch registration control (available only when PK is installed)

The FNS conveyance motor (M1) turns OFF temporarily to stop conveyance of paper when the specified time has passed since paper exit sensor (PS37) detected the leading edge of the paper. Thus the paper is pressed against the entrance roller forming a loop to correct the bend. When the specified time has passed, M1 turns ON to restart conveying the paper.The above operation is not performed when conveying a large paper (220 mm and longer in the sub scan direction) and in the non-punchingmode.
When punching the paper conveyed from PI, the loop is formed on the PI's side. For details, refer to PI-502 service manual.



[1] Main body
[2] Entrance roller
[3] Loop
[4] PK (option)

4.3.2 FS transfer control

The FS transfer is conducted by the 24V DC motor controlled by the FNS control board (FNSCB).

A. Door switch control

The FS transfer drive control is started when transmitting the start signal from the main body. However, en error message is transmitted to the main body PRCB and the control is not started if the door switch (MS1) turns OFF.

B. FS transfer control

The FNS transfer motor (M1) rotates in high speed when pressing the start button. In the mode the paper is exited from the main body in slow speed, M1 rotates in slow speed when the main body paper exit sensor (PS37) turns ON. Then it rotates in high speed after a specified period of time since the FNS entrance sensor (PS4) turns ON.

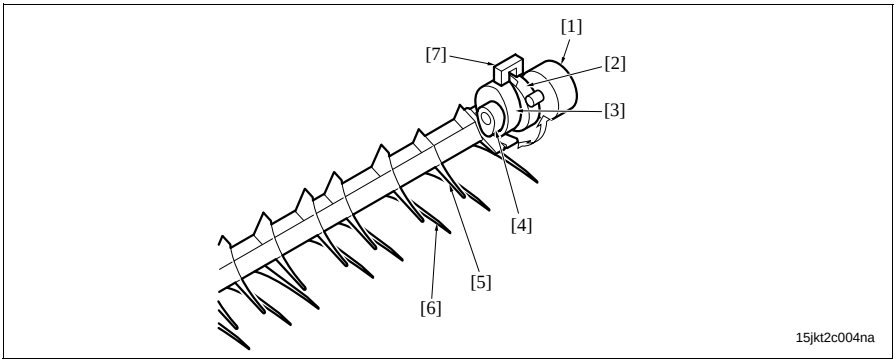
When exiting to the main tray, M1 rotates in middle speed to in sync with the FS paper exit line speed after a specified period of time since PS4 detects the trailing edge of the paper. Then after a specified period of time, M1 returns to rotate in high speed and waits for the subsequent paper.

4.3.3 Gate drive control

The gate switches among the paper transfer path to the main tray, the one to the sub tray, and the one to the stacker.

A. Gate operation

The gate motor (M12) drives the gate cam [2], and then 2 cams /UP [3] and /Lw [4] of the gate cum drive the 2 gates /UP [5] and /Lw [6] respectively. The gate home sensor (PS16) [7] detects the home position.



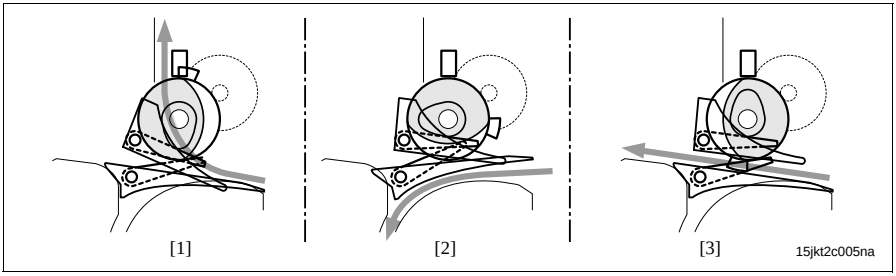
[1] Gate motor (M12)
[2] Gate cam
[3] Cam /Up
[4] Cam /Lw
[5] Gate /Up
[6] Gate /Lw
[7] Gate home sensor (PS16)

B. Gate control

The FNS control board (FNSCB) controls the gate.

The gate turns ON when transmitting the FS operation signal from the main body, and then it stops either at the sub tray (home position) [1], stacker [2], or main tray [3]. It does not move when exiting to the sub tray because the sub tray is the home position.

When completing the printing, the gate home sensor (PS16) detects the home position and stops the gate.



[1] Sub tray (home position)
[2] Stacker
[3] Main tray

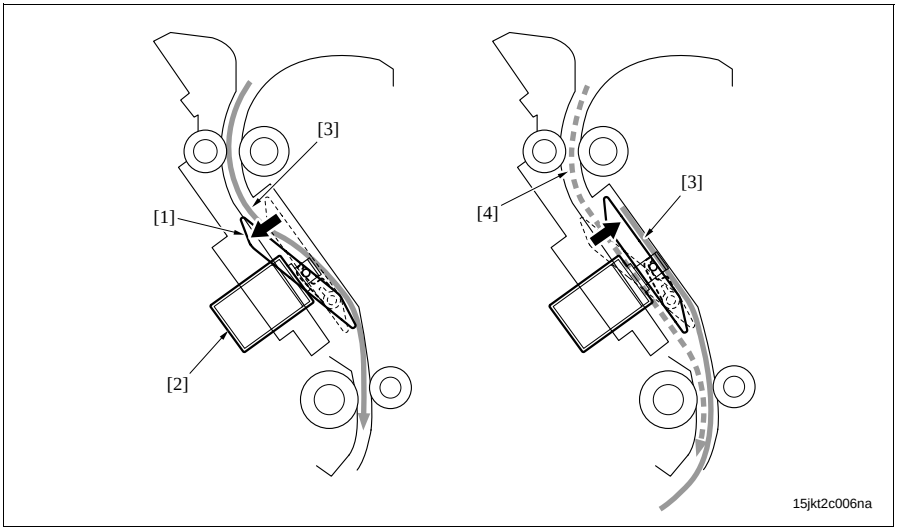
4.3.4 Bypass gate control

The bypass gate is located in the paper path to the stacker section. The bypass gate is the gate to transfer the subsequent paper during the stapling operation for eliminating the time loss and increasing the productivity.

A. Bypass gate operation

The bypass gate solenoid (SD5) [2] drives the bypass gate [1].

For the small size paper (A4, B5, and 8½ x 11), it operates only for the 1st page of the 2nd and following copies to transfer the paper to the bypass route [3]. The 2nd page of the 2nd and following copies is transferred to the regular route [4] and overlapped under the 1st page, and then the transferred to the stacker section.



[1] Bypass gate

[2] Bypass gate solenoid (SD5)

[3] Bypass route

[4] Regular route

B. Bypass gate control

The bypass gate only operates for the small size paper (A4, B5, and 8½ x 11) in the stapling mode. The FNS control board (FNSCB) controls the bypass gate solenoid (SD5).

When stapling 2 sheets of paper for 3 copies, SD5 operates as follows.

(1) For the 1st copy

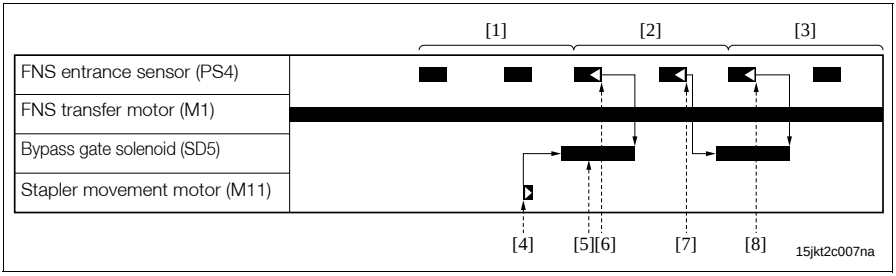
When the paper for the 1st copy is transferred, the bypass gate solenoid (SD5) does not operate.

(2) For the 2nd copy

The bypass gate solenoid (SD5) turns ON and draws the 1st paper of the 2nd copy to the bypass after a specified period of time since the staple operation for the 1st copy is started [4]. SD5 turns OFF after a specified period of time since the FNS entrance sensor (PS4) detects the trailing edge of the paper [6].

(3) For the 3rd and following copies

The bypass gate (SD5) turns ON and draws the 1st paper of the 3rd copy to the bypass after a specified period of time since the FNS entrance sensor (PS4) detects the trailing edge of the last paper of the 2nd copy [7]. SD5 turns OFF after a specified period of time since PS4 detects the trailing edge of the paper [8].



[1] The 1st copy

[2] The 2nd copy

[3] The 3rd copy

[4] Stapling operation for the 1st copy started

[5] Drawing the 1st paper of the 2nd copy to the bypass

[6] Trailing edge of the 1st paper of the 2nd copy

[7] Trailing edge of the last paper of the 2nd copy

[8] Trailing edge of the 1st paper of the 3rd copy

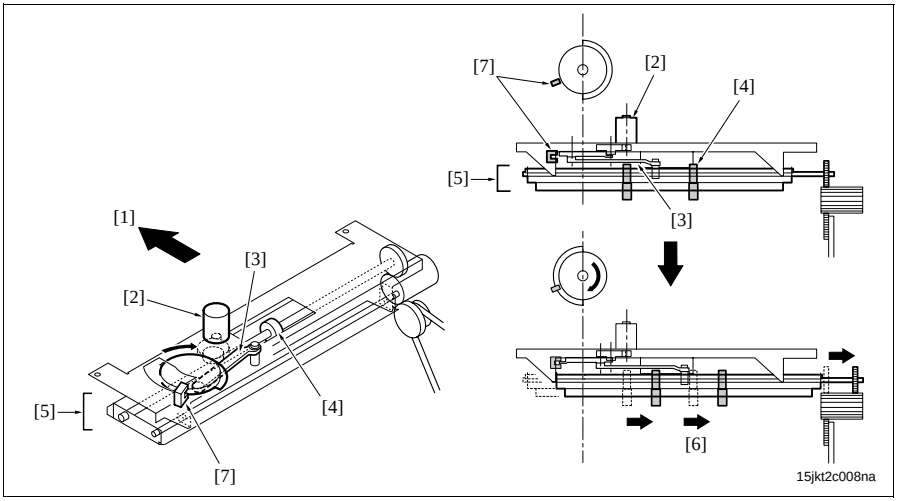
4.3.5 Shift control

The FNS transfer motor (M1) drives the shift roller. The shift roller moves itself backward to shift the paper while transferring the paper to the main tray.

A. Shift operation

During conveying the paper to the main tray [1], the crank mechanism [3] shifts the shift movable section [5] including the shift roller [4] approximately 30 mm backward [6] to shift and exit the paper when shift roller motor (M2) [2] rotates.

The shift roller home sensor (PS18) [7] detects the shift position.



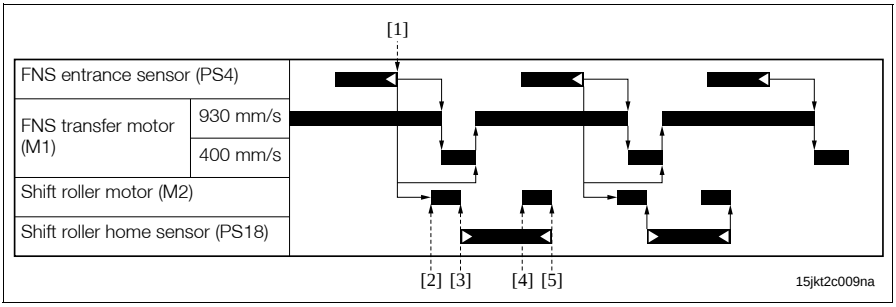
[1] To the main tray
[2] Shift roller motor (M2)
[3] Crank mechanism
[4] Shift roller
[5] Shift movable section
[6] Rear
[7] Shift roller home sensor (PS18)

B. Shift control

In the sort/group mode, the shift roller motor (M2) turns ON [2] and shifts the shift movable section after a specified period of time since the FNS entrance sensor (PS4) detects the trailing edge of the paper [1]. The FNS transfer motor (M1) drives the shift roller. It shifts the paper while transferring it.

M2 stops when the shift roller completes the shift operation and the shift roller home sensor (PS18) turns ON [3]. Then, M2 turns ON [4] again after a specified period of time since it stops. It stops when PS18 turns OFF [5]. This operation replaces the shift movable section to its original position, and then it stands by for the subsequent paper to be shifted.

These operations are repeated for every paper to offset it.



[1] Trailing edge of the paper detected

[2] Shift started

[3] Shift completed

[4] Moving to the home position started

[5] Moving to the home position completed

4.3.6 Paper exit roller control

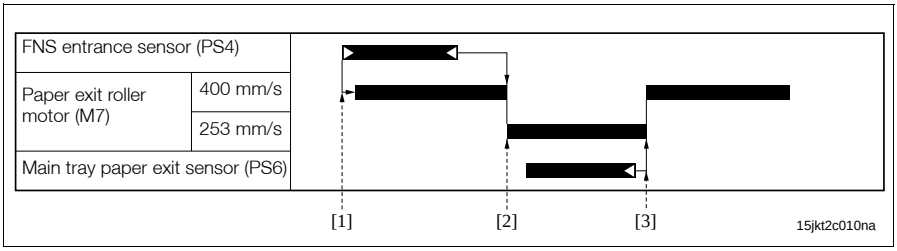
The paper exit roller motor (M7) controlled by the FNS control board (FNSCB) drives the main tray paper exit roller and the paper exit belt.

A. Non-sort/sort/group mode

The paper exit roller motor (M7) rotates in high speed when the FNS entrance sensor (PS4) detects the leading edge of the paper [1]. M7 rotate in low speed [2] and exits the paper after a specified period of time since PS4 detects the trailing edge of the paper.

To transfer the subsequent paper, M7 rotate in high speed again after a specified period of time since the main tray paper exit sensor (PS6) detects the trailing edge of the paper [3].

M7 stops after a specified period of time since PS6 detects the last paper.



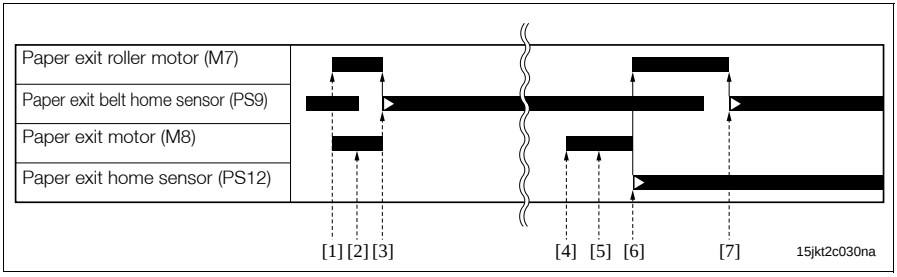
[1] Leading edge of the paper detected
[2] Paper exit started
[3] Preparing to transfer the subsequent paper

B. Stapling mode (when the paper length is B5S or longer in the sub scan direction)

Transmitting the FNS signal [1] from the main body, the paper exit roller motor (M7) rotates to drive the paper exit belt in the stacker section. M7 stops and the paper exit arm moves to the home position for the stapling mode when the paper exit belt home sensor (PS9) turns ON [3].

The paper exit opening is open if the paper length is longer than B5S in the sub scan direction. The paper exit motor (M8) closes the paper exit opening when the stapling operation is completed. M7 rotates to drive the paper exit arm when the paper exit home sensor (PS12) detects the opening is closed [6]. The paper exit arm lifts up the paper to the paper exit roller, and then the paper exit roller exits the paper to the main tray.

M7 stops when PS9 turns ON [7].



[1] FNS signal turned ON
[2] Opening the paper exit opening
[3] Paper exit arm home position
[4] Stapling operation completed
[5] Closing the paper exit opening
[6] Paper exit opening closed
[7] Paper exit arm home position

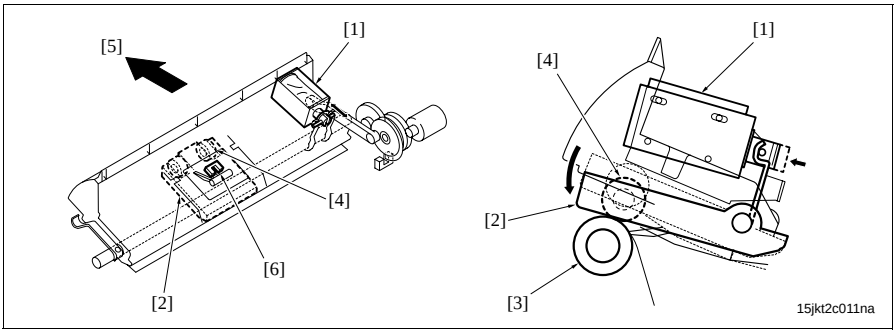
4.3.7 Paper exit opening solenoid control

The paper exit roller is usually releasing the nip except when exiting the paper because its rotation is slower than the transfer roller. However, the nip movable section moves to nip the paper when the paper reaches to the paper exit opening.

A. Paper exit opening solenoid operation

When the paper reaches to the paper exit opening, the paper exit opening solenoid (SD4) [1] moves the nip movable section [2] to nip the paper by pressurizing the nip roller [4] to the main tray paper exit roller [3] and exit the paper to the main tray direction [5].

The main tray paper exit sensor (PS6) [6] detects the paper exit.



[1] Paper exit opening solenoid (SD4)
[2] Nip movable section
[3] Main tray exit roller
[4] Nip roller
[5] To the main tray
[6] Main tray paper exit sensor (PS6)

B. Timing to turn ON the paper exit opening solenoid

(1) Non-sort/sort/group mode

The paper exit opening solenoid (SD4) turns ON after a specified period of time since the FNS entrance sensor (PS4) detects the trailing edge of the paper.

(2) Stapling mode

The paper exit opening solenoid (SD4) turns ON to nip the paper after a specified period of time since the stapling operation is completed.

C. Timing to turn OFF the paper exit opening solenoid

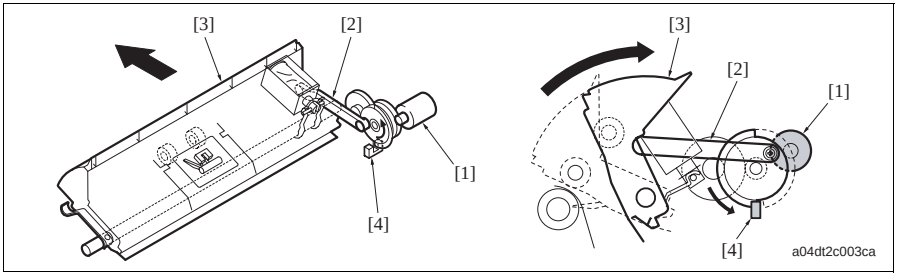
In all modes, the paper exit opening solenoid (SD4) turns OFF after a specified period of time since the main tray paper exit sensor (PS6) detects the paper.

4.3.8 Paper exit opening control

In the stapling mode (when the paper length is B5S or longer in the sub scan direction) and the folding/saddle stitching/tri-folding mode, the paper exit opening is opened from the beginning of the printing operation to the end of the stapling operation because the paper protrudes.

A. Paper exit opening/closing operation

The paper exit opening unit [3] opens/closes by the crank mechanism [2] when the paper exit motor (M8) [1] rotates. The paper exit home sensor (PS12) [4] detects the opening/closing of the paper exit opening.



[1] Paper exit motor (M8)
[2] Crank mechanism
[3] Paper exit unit
[4] Paper exit home sensor (PS12)

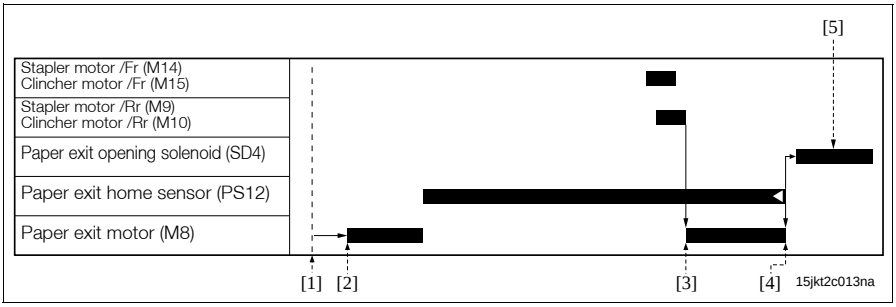
B. Paper exit opening/closing control

(1) Stapling mode (when the paper length is B5S or longer in the sub scan direction)

Transmitting the FNS signal [1] from the main body, the paper exit motor (M8) rotates [2] to open the paper exit opening.

When the stapling operation completes, M8 turns ON [3] again to close the paper exit opening. It stops when the paper exit home sensor (PS12) detects the paper exit opening is closed.

These operations are repeated for every stapled bundle.



[1] FNS start signal turned ON

[2] Opening the paper exit opening

[3] Closing the paper exit opening

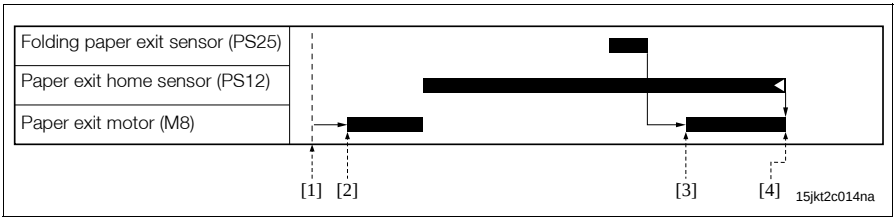
[4] Paper exit opening closed

[5] Paper nipped by the paper exit opening solenoid (SD4)

(2) Folding/saddle stitching/tri-folding mode

Transmitting the start signal [1] from the main body, the paper exit motor (M8) rotates [2] to open the paper exit opening.

M8 turns ON [3] again to close the paper exit opening after a specified period of time since the folding paper exit sensor (PS25) or the folding full sensor (PS29) detects the trailing edge of the last page. It stops when the paper exit home sensor (PS12) detects the paper exit opening is closed [4].



[1] FNS start signal turned ON

[2] Opening the paper exit opening

[3] Closing the paper exit opening

[4] Paper exit opening closed

4.3.9 Sub tray paper exit control

The sub tray paper exit motor (M21) controlled by the FNS control board (FNSCB) drives the sub tray paper exit roller.

A. Sub tray paper exit motor (M21) control

The sub tray paper exit motor (M21) rotates in high speed when the sub tray paper exit sensor (PS1) detects the leading edge of the paper.

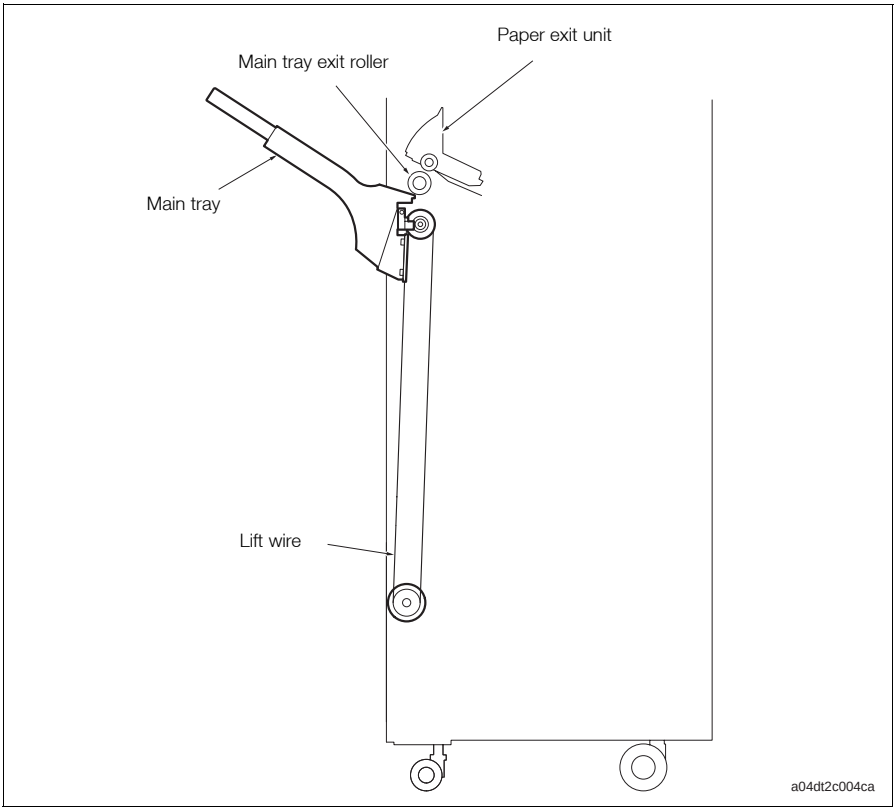
M21 rotates in low speed after a specified period of time since the FNS entrance sensor (PS4) detects the trailing edge of the paper. M21 stops after a specified period of time since PS1 detects the trailing edge of the paper.

B. Sub tray full detection

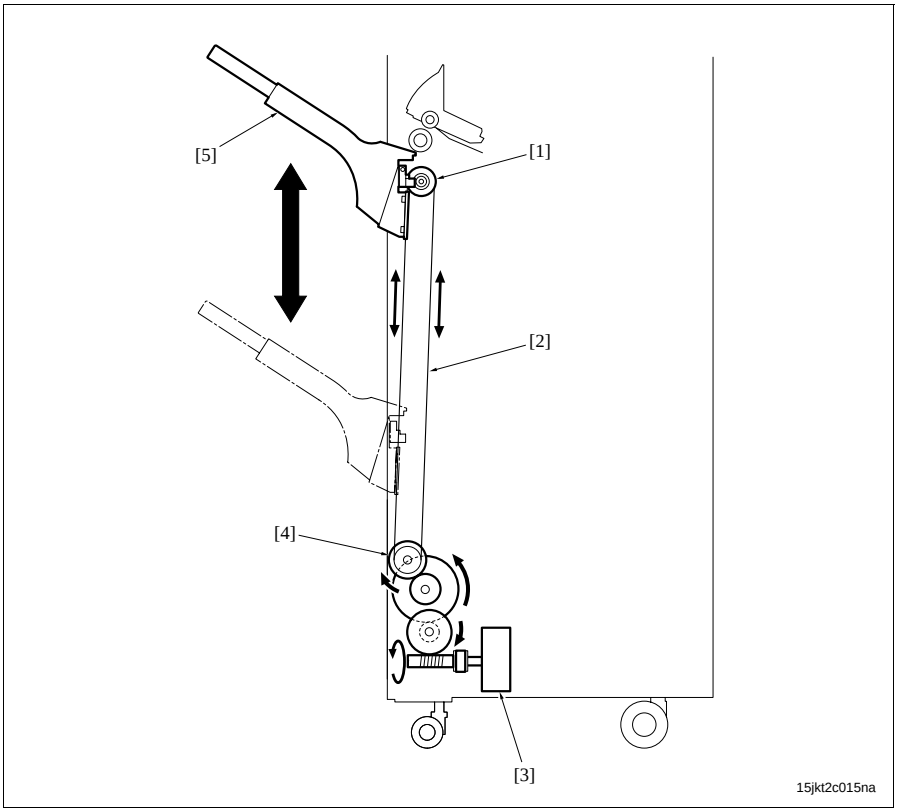
When the exited paper on the sub tray reached to a specified thickness, the sub tray full sensor (PS19) turns ON and the sub tray full information is sent to the main body. Then, the main body displays the message on its display panel.

5. MAIN TRAY SECTION

5.1 Composition



5.2 Drive



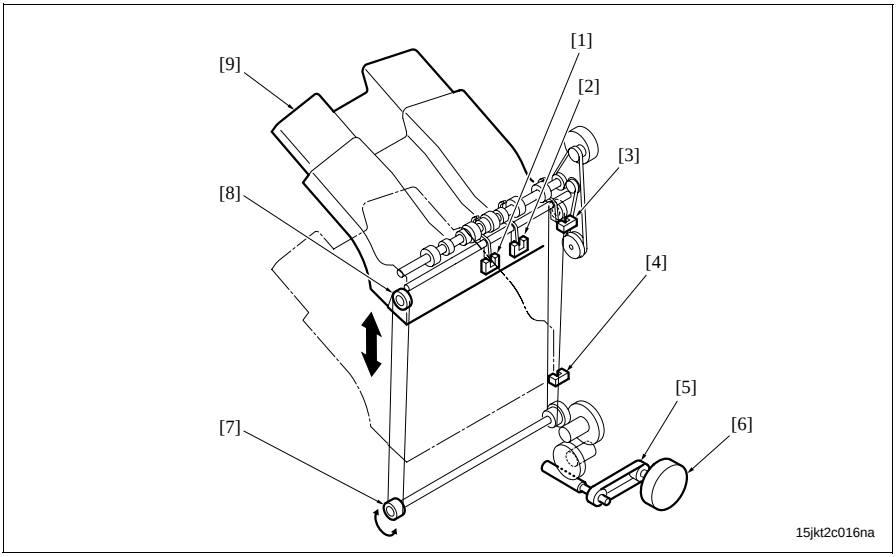
[1] Lift pulley /Up
[2] Lift wire
[3] Main tray lift motor (M3)
[4] Lift pulley /Lw
[5] Main tray

5.3 Operation

5.3.1 Tray lift control

A. Tray lift operation

The worm gear installed in the shaft of the main tray lift motor (M3) [6] winds up the lift wire.
It lifts up or down the main tray [9] depending on the winding direction. Rotating the lift pulley /Lw clockwise and counterclockwise in view of front, the main tray is lifted up and down respectively.



[1] Stapler paper exit upper limit sensor (PS7)
[2] Main tray upper limit sensor (PS2)
[3] Counter reset sensor (PS15)
[4] Main tray lower limit sensor (PS3)
[5] Timing belt
[6] Main tray lift motor (M3)
[7] Lift pulley /Lw
[8] Lift pulley /Up
[9] Main tray

B. Paper detection

The main tray upper limit sensor (PS2) [2] and the stapler paper exit upper limit sensor (PS7) [1] keep the specified distance between the upper surface of the paper exited to the main tray (the upper surface of the main tray if there is no exited paper) and the paper exit opening to eliminate the misalignment of the exited paper.
During the consecutive printing operation, FS counts the number of exited paper and stops the printing when it reaches the maximum capacity.
If the exited paper is ejected during the printing operation, the tray moves up and the counter reset sensor (PS15) [3] turns ON and resets the counter. It makes possible to exit paper with no limitation.
The main tray lower limit sensor (PS3) [4] detects the lower limit of the tray. During the intermittent printing operation, PS3 controls the capacity of the paper exit because the counter does not integrate the total number of exited paper.

C. Tray lift control

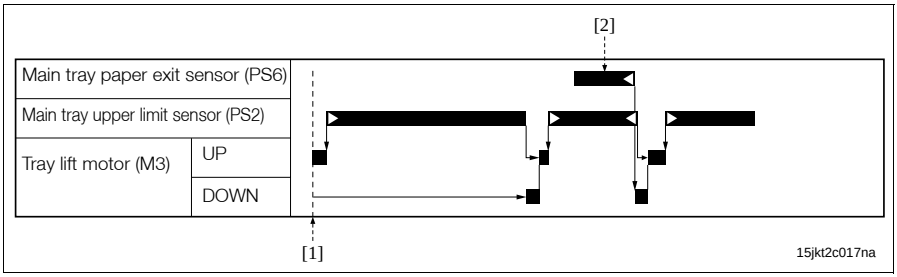
The main tray lift motor (M3) lifts up and down the main tray by rotating in the forward and reverse direction respectively. The FNS control board (FNSCB) controls M3.

(1) Non-sort/sort/group mode

Transmitting the FNS signal from the main body, the tray lift motor (M3) lifts up the tray until the main tray upper limit sensor (PS2) turns ON.

M3 lifts down the tray when the paper passes the main tray paper exit sensor (PS6). M3 lifts up the tray again after a specified period of time since the PS2 turns OFF, and then stops when PS2 turns ON.

These operations are repeated for every paper.



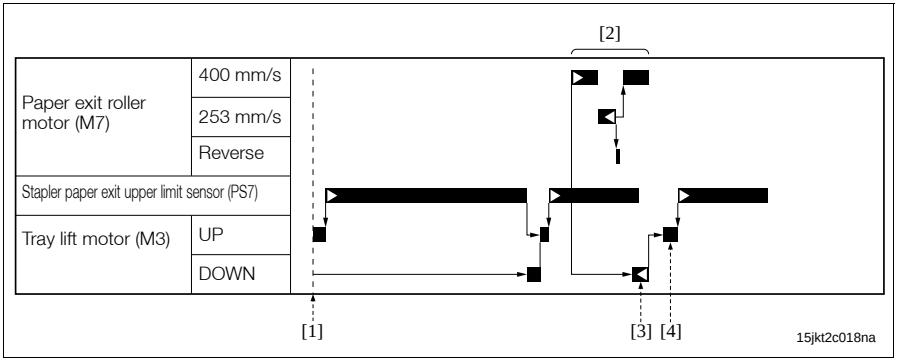
[1] FNS start signal turned ON

[2] Paper exited to the main tray

(2) Stapling mode

Transmitting the FNS signal from the main body, the tray lift motor (M3) lifts up the tray until the stapler paper exit upper limit sensor (PS2) turns ON.

The tray lift motor (M3) lifts down the main tray after a specified period of time since the paper exit roller motor (M7) turns ON. After a specified period of time, M3 rotates in the reverse direction to lift up the main tray, and then stops when the stapler paper exit upper limit sensor (PS7) turns OFF.



[1] FNS start signal turned ON

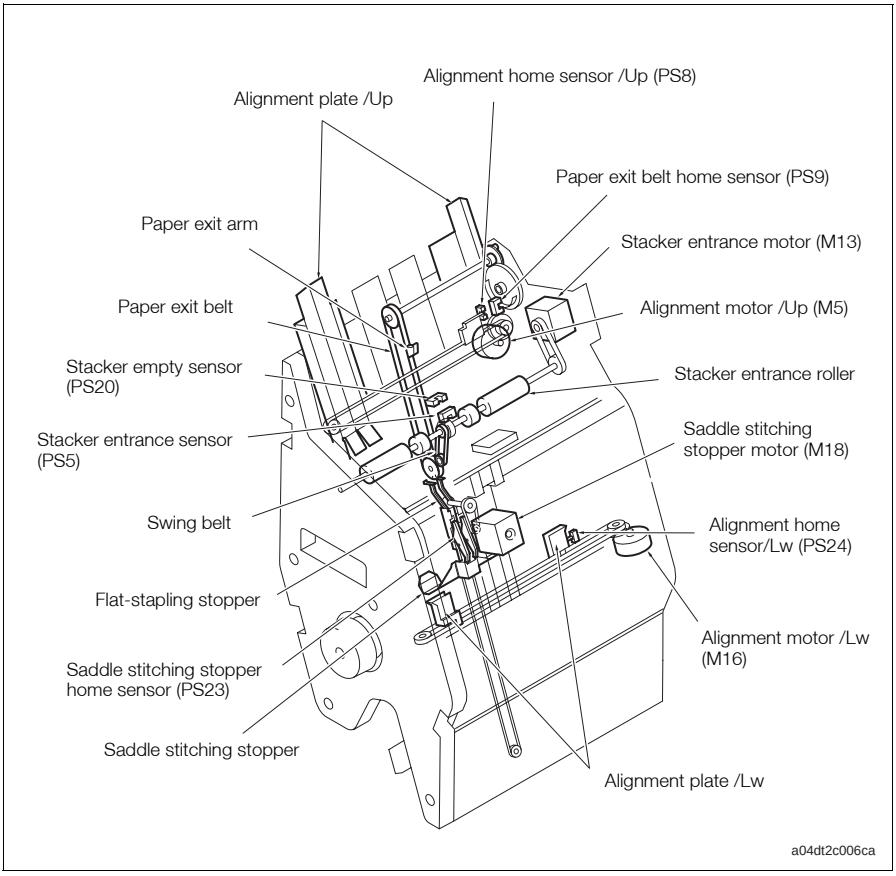
[2] Paper bundle exited to the main tray

[3] Main tray lifted down

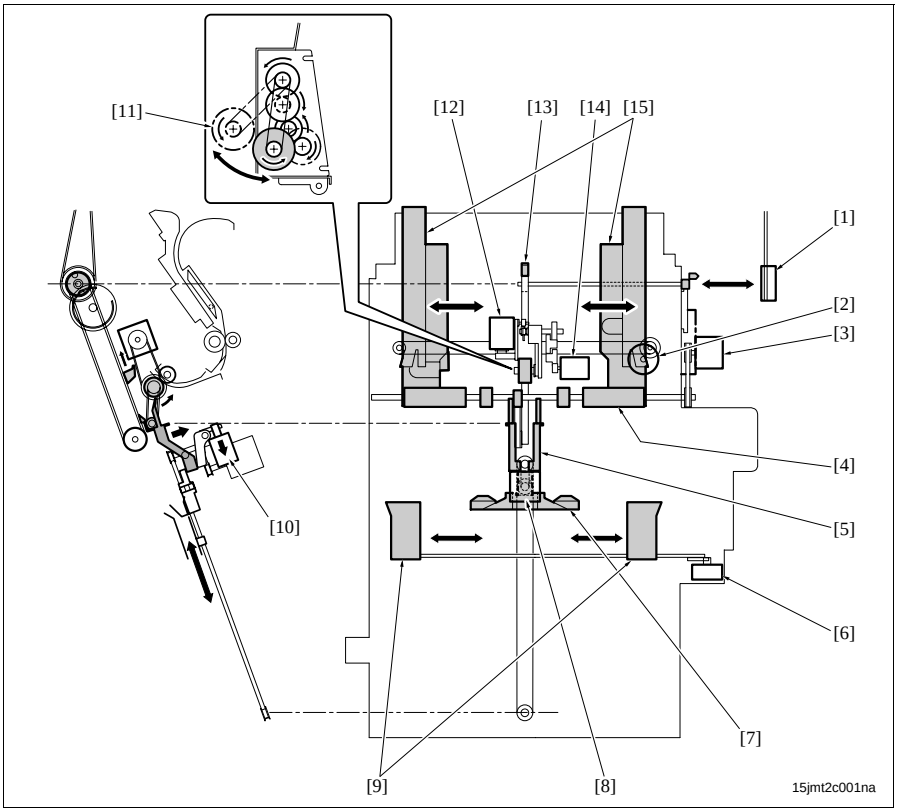
[4] Main tray lifted up

6. STACKER SECTION

6.1 Composition



6.2 Drive

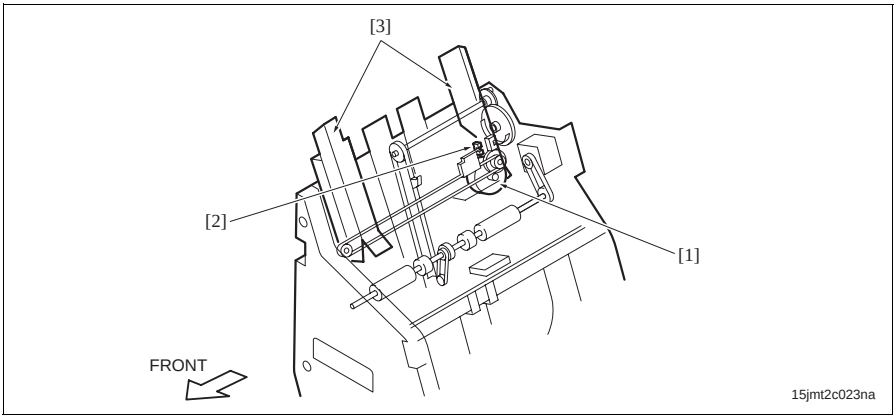


[1] Coupling (from M7)
[2] Alignment motor /Up (M5)
[3] Stacker entrance motor (M13)
[4] Stacker entrance roller
[5] Flat-stapling stopper /Fr, Flat-stapling stopper /Rr
[6] Alignment motor /Lw (M16)
[7] Saddle stitching stopper
[8] Saddle stitching stopper motor (M18)
[9] Alignment plate /Lw
[10] Flat-stapling stopper release solenoid /Fr (SD8), Flat-stapling stopper release solenoid /Rr (SD7)
[11] Paper assist roller
[12] Paper assist solenoid (SD51)
[13] Paper exit arm
[14] Paper assist motor (M51)
[15] Alignment plate /Up

6.3 Operation

6.3.1 Alignment /Up control

In the stapling/saddle stitching/tri-folding mode, the alignment motor /Up (M5) rotates in the forward/reverse direction to open/close the alignment plate /Up to perform the alignment of the paper transferred to the stacker in the main scan direction.



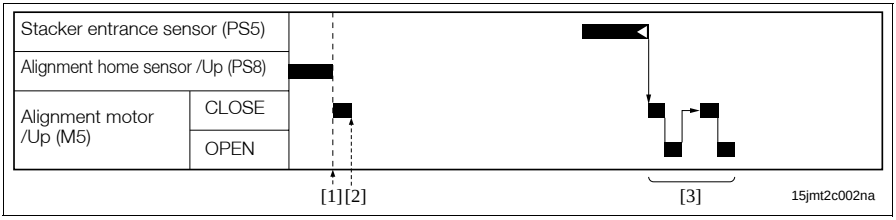
[1] Alignment motor (M5)
[2] Alignment home sensor (PS8)
[3] Alignment plate /Up

A. Alignment /Up operation

The alignment motor /Up (M5) rotates to open/close the alignment plate via the alignment belt.
The alignment home sensor /Up (PS8) detects the home position of the alignment plate.

B. Alignment /Up control

Transmitting the FNS signal from the main body, the alignment motor /Up (M5) rotates to close the alignment plate /Up [1], and then it stops the alignment plate at the standby position that is a little wider than the paper width [2].
M5 performs the alignment operation by rotating in the forward and reverse direction to move the alignment plate /Up back and forth after a specified period of time since the stacker entrance sensor (PS5) detects the trailing edge of the paper. The alignment operation is performed for every paper [3].

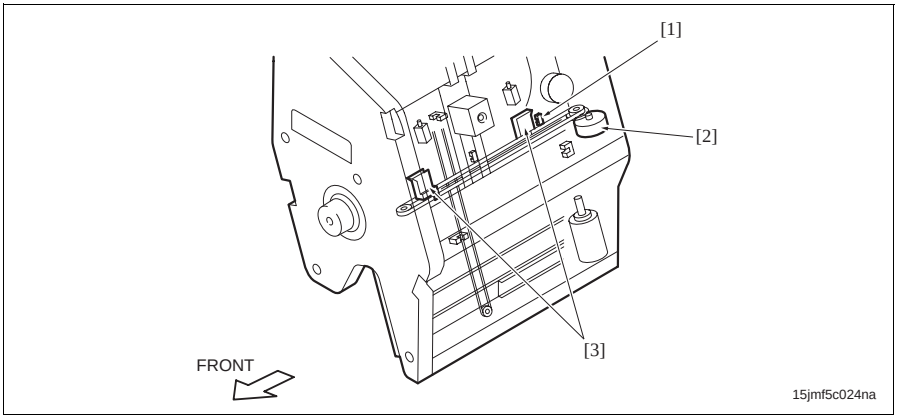


[1] Closing the alignment plate /Up (FNS signal)
[2] Standby position of the alignment plate /Up
[3] Alignment operation for every paper

6.3.2 Alignment /Lw control

In the saddle stitching/folding/tri-folding mode, the alignment plate /Up and the alignment plate /Lw move back and forth to align the paper in the main scan direction.

The alignment motor /Lw (M16) performs the alignment operation by rotating in the forward and reverse direction to move the alignment plate back and forth.



[1] Alignment plate home sensor /Lw (PS24)
[2] Alignment motor /Lw (M16)
[3] Alignment plate /Lw

A. Alignment /Lw operation

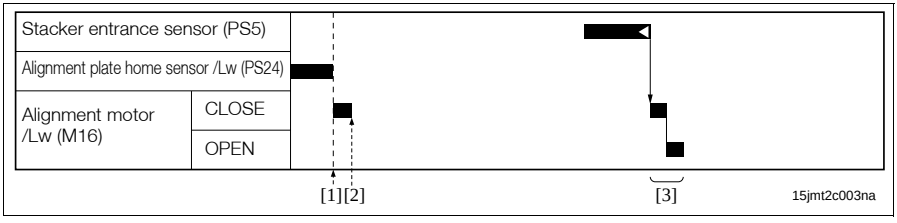
The alignment motor /LW (M16) rotates to open/close the alignment plate via the alignment belt.

The alignment home sensor /Lw (PS24) detects the home position of the alignment plate.

B. Alignment /Lw control

In the saddle stitching/folding/tri-folding mode, transmitting the FNS signal from the main body, the alignment motor /Lw (M16) rotates to close the alignment plate /Lw [1], and then it stops the alignment plate at the standby position that is a little wider than the paper width [2].

M16 performs the alignment operation by rotating in the forward and reverse direction to move the alignment plate /Lw back and forth after a specified period of time since the stacker entrance sensor (PS5) detects the trailing edge of the paper. The alignment operation is performed for every paper [3].



[1] Closing the alignment plate /Lw (FNS signal)
[2] Standby position of the alignment plate /Lw
[3] Alignment operation for every paper

6.3.3 Stopper control

The stopping position in vertical direction of paper conveyed to the stacker is different among the stapling mode, the saddle stitching mode, and the folding mode.

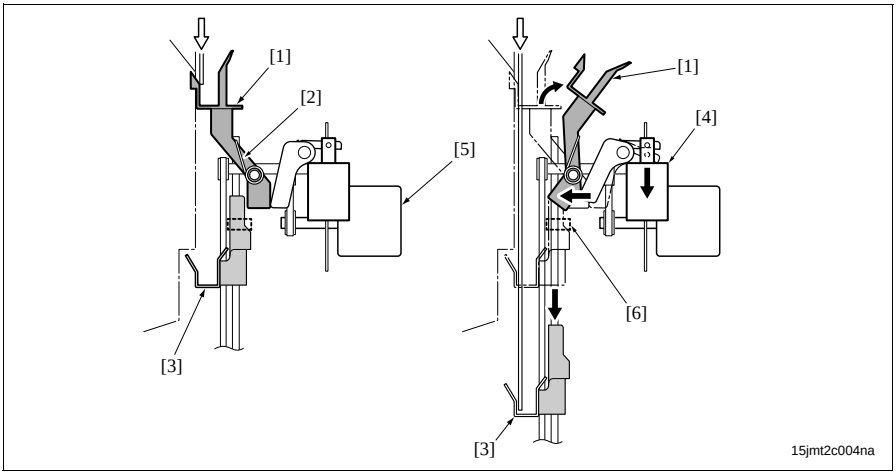
2 stoppers (the saddle stitching stopper and the flat-stapling stopper) control the stopping position of paper.

A. Stopper operation

In the stapling mode, the flat-stapling stopper [1] is set on the paper path by the pushing pressure by the spring [2]. The flat-stapling stopper [1] determines the position of the leading edge of the fallen paper.

In the saddle stitching/folding/tri-folding mode, the flat-stapling release solenoids (SD7 and SD8) turn ON and evacuate the flat-stapling stopper from the paper path. Then, the paper falls down to the saddle stitching stopper [3] without contacting with the flat-stapling stopper.

The saddle stitching stopper motor (M18) [5] moves the saddle stitching stopper up and down in accordance with the paper size. The saddle stitching stopper home sensor (PS23) [6] detects the home position.



[1] Flat-stapling stopper

[2] Spring

[3] Saddle stitching stopper

[4] Flat-stapling stopper release solenoids (SD7 and SD8)

[5] Saddle stitching stopper motor (M18)

[6] Saddle stitching stopper home sensor (PS23)

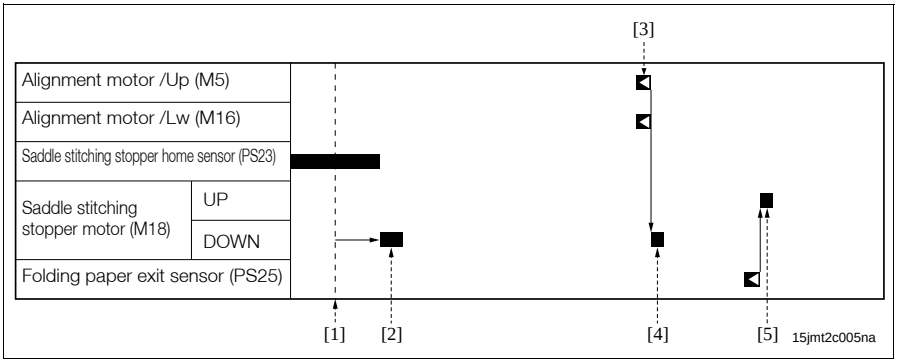
B. Stopper control

(1) Folding mode

Transmitting the FNS signal from the main body [1], the saddle stitching stopper motor (M18) rotates [2] to move down the saddle stitching stopper to the stopping position in accordance with the paper size.

After completing the alignment operation of the last paper [3], M18 rotates [4] to move down the saddle stitching stopper to the folding position.

After completing the folding operation, when the folding paper exit sensor (PS25) detects the trailing edge of the paper bundle, M18 rotates [5] to move up the saddle stitching stopper to the alignment position in accordance with the paper size and stand by for the paper of the subsequent copy.



[1] FNS start signal turned ON

[2] Moving to the alignment position for the paper size

[3] Last paper of the copy aligned

[4] Moving to the folding position for the paper size

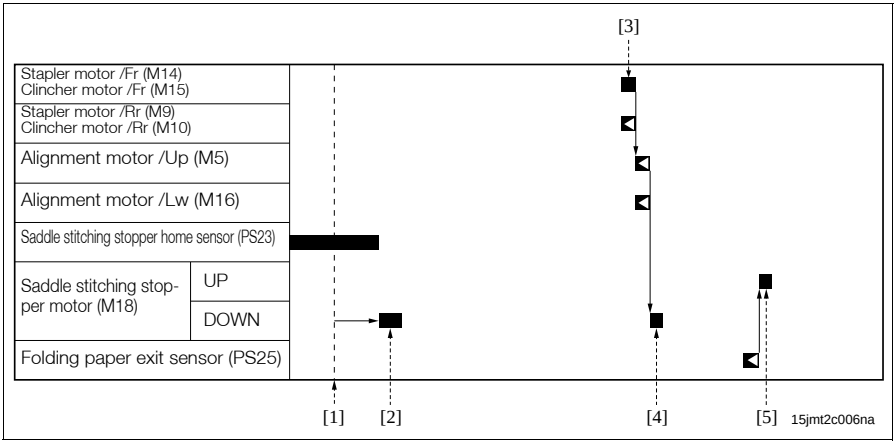
[5] Moving to the alignment position for the subsequent copy

(2) Saddle stitching mode

Transmitting the FNS signal from the main body [1], the saddle stitching stopper motor (M18) rotates [2] to move down the saddle stitching stopper to the stopping position in accordance with the paper size.

After completing the stapling operation [3], the alignment motors /Up (M5) and /Lw (M16) open the alignment plate and M18 rotates [4] to move down the saddle stitching stopper to the folding position.

After completing the folding operation, when the folding paper exit sensor (PS25) detects the trailing edge of the paper bundle, M18 rotates [5] to move up the saddle stitching stopper to the saddle stitching position in accordance with the paper size and stand by for the paper of the subsequent copy.



[1] FNS start signal turned ON

[2] Moving to the saddle stitching position for the paper size

[3] Stapling operation

[4] Moving to the folding position for the paper size

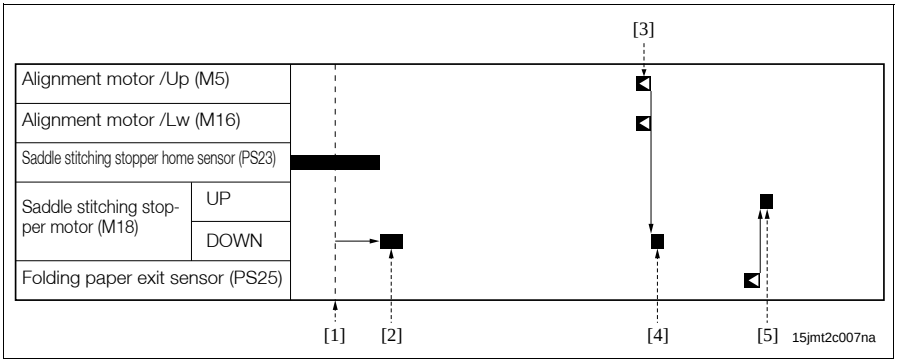
[5] Moving to the saddle stitching position for the subsequent copy

(3) Tri-folding mode

Transmitting the FNS signal from the main body [1], the saddle stitching stopper motor (M18) rotates [2] to move down the saddle stitching stopper to the stopping position in accordance with the paper size.

After completing the alignment operation of the last paper [3], M18 rotates [4] to move down the saddle stitching stopper to the 1st folding position in the tri-folding.

After completing the folding operation, when the folding paper exit sensor (PS25) detects the trailing edge of the paper bundle, M18 rotates [5] to move up the saddle stitching stopper to the alignment position in accordance with the paper size and stand by for the paper of the subsequent copy.



[1] FNS start signal turned ON

[2] Moving to the alignment position for the paper size

[3] Last paper of the copy aligned

[4] Moving to the 1st folding position

[5] Moving to the alignment position for the subsequent copy

(4) Flat-stapling mode

The saddle stitching stopper motor (M18) does not operate in the flat-stapling mode.

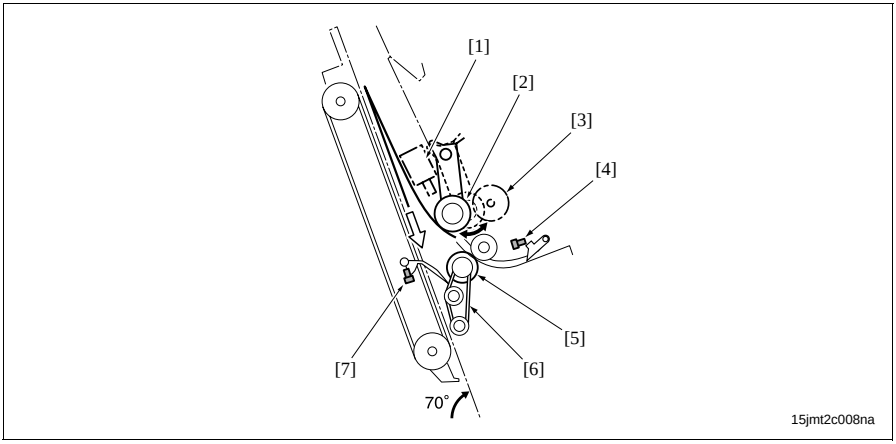
6.3.4 Stacker entrance transfer control

The stacker entrance motor (M13) drives the stacker entrance roller, swing belt to transfer the paper to the stacker, align the trailing edge of the paper, and adjust the staple wait timing.

A. Stacker entrance operation

The downsizing of the device is achieved by adopting the stack method whose incline angle is approximately 70°. The corrugation roller is adopted for the stacker entrance roller [5] to assist the paper exit to the stacker. After the paper falls to the stacker, the swing belt [6] align the paper with its trailing edge.

To assist in aligning the curled paper with the trailing edge according to the number of sheets stacked and the paper size, the paper assist solenoid (SD51) [1] pressurizes the paper while the paper assist motor (M51) [3] drives the paper assist roller [2].



[1] Paper assist solenoid (SD51)
[2] Paper assist roller
[3] Paper assist motor (M51)
[4] Stacker entrance sensor (PS5)
[5] Stacker entrance roller
[6] Swing belt
[7] Stacker empty sensor (PS20)

B. Stacker entrance transfer control

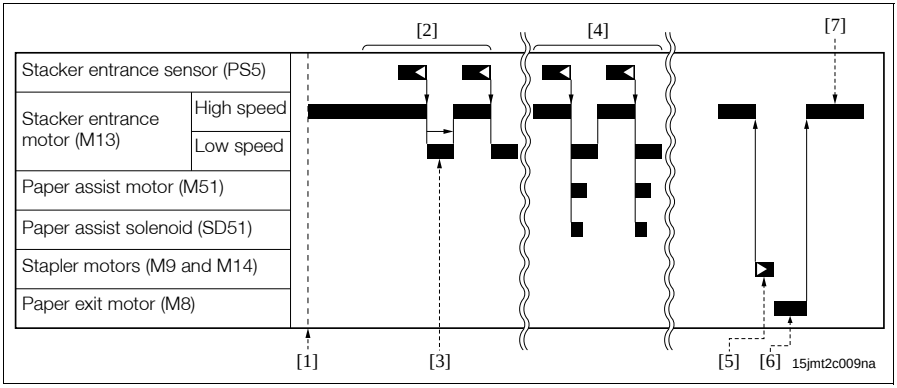
(1) Stapling mode (the paper size is not A4, B5, or 8½ x 11, without the bypassing operation)

Transmitting the FNS signal from the main body [1], the stacker entrance motor (M13) turns ON and rotates in high speed.

M13 rotates in low speed [3] when the stacker entrance sensor (PS5) detects the trailing edge of the paper and then the paper assist roller starts to rotate to transfer the paper to the stacker in low speed. When the paper assist roller is driven, the paper assist motor (M51) and the paper assist solenoid (SD51) operate to assist the stacking operation. M13 rotates in high speed and stands by for the subsequent paper after a specified period of time since it rotates in low speed.

After the last paper of the copy passes, M13 stops when the stapling operation is started [5].

M13 turns ON [6] and rotates in high speed to stand by for the subsequent paper when the paper exit motor (M8) completes the closing operation.



[1] FNS start signal turned ON

[2] 1st to 9th paper

[3] Paper transferred to the stacker in low speed

[4] Paper assist roller in operation

[5] Stapling operation

[6] Closing the paper exit opening

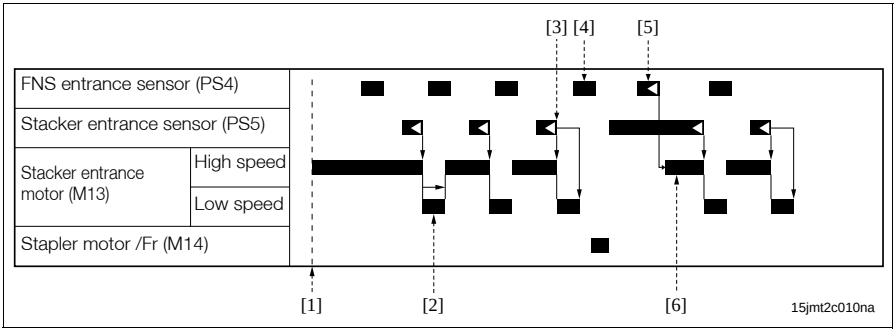
[7] Standing by for the paper of the subsequent copy

(2) Stapling mode (the paper size is A4, B5, or 8½ x 11, with the bypassing operation)

The 1st copy is transferred by the same operation for the paper whose size is other than A4, B5, or 8½ x 11.

When transferring the 1st and 2nd paper of the 2nd and following copies, the stacker entrance motor (M13) stops after a specified period of time since the stacker entrance sensor (PS5) detects the trailing edge of the last paper of the 1st copy [3]. To prevent the paper of the 2nd copy is transferred to the stacker before the stapling operation for the 1st copy is completed, the 1st paper for the 2nd copy stands by in the bypass path.

The stacker entrance motor (M13) turns ON and rotates in high speed after a specified period of time since the FNS entrance sensor (PS4) detects the trailing edge of the 2nd paper [5]. Then the 1st and 2nd paper are overlapped and transferred to the stacker [6].



[1] FNS start signal turned ON

[2] Paper transferred to the stacker in low speed

[3] Trailing edge of the last paper of the 1st copy detected

[4] 1st paper of the 2nd copy

[5] 2nd paper of the 2nd copy

[6] 1st and 2nd paper of the 2nd copy transferred simultaneously

When transferring the 3rd and following paper of the 2nd and following copies, the paper is transferred to the stacker by the same operation for the paper of the 1st copy.

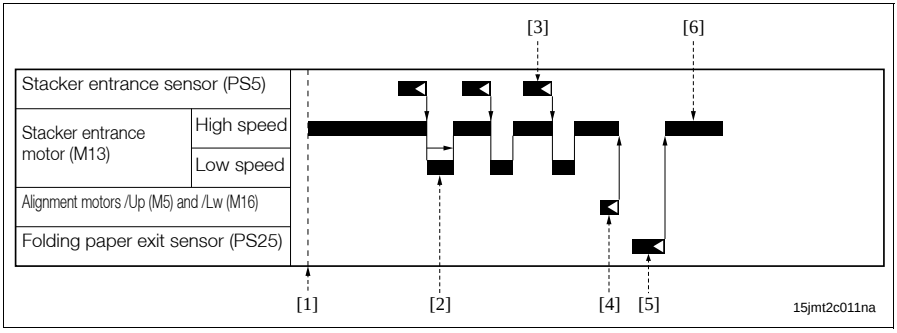
(3) Folding/saddle stitching mode

Transmitting the FNS signal from the main body [1], the stacker entrance motor (M13) turns ON and rotates in high speed.

M13 rotates in low speed [2] to transfer the paper in low speed when the stacker entrance sensor (PS5) detects the trailing edge of the paper. M13 rotates in high speed and stands by for the subsequent paper after a specified period of time since it rotates in low speed.

M13 stops after completing the alignment operation [4] of the last paper of the copy [3].

M13 turns ON and rotates in high speed to stand by for the subsequent paper when the folding paper exit sensor (PS25) detects the trailing edge of the paper bundle [5].



[1] FNS start signal turned ON

[2] Paper transferred to the stacker in low speed

[3] Last paper of the copy

[4] Last paper of the copy aligned

[5] Folding paper exit operation

[6] Standing by for the paper of the subsequent copy

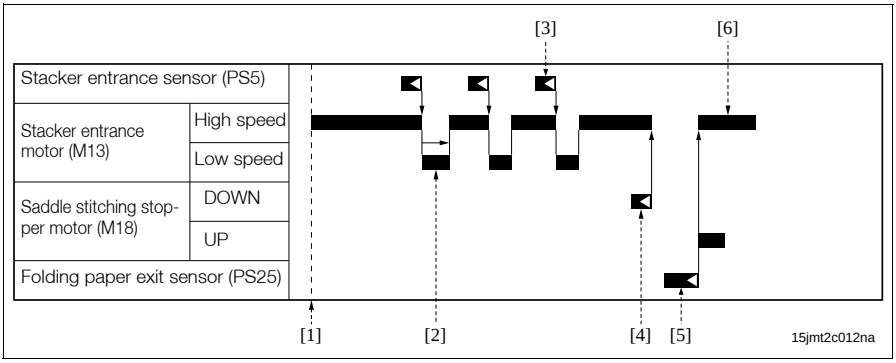
(4) Tri-folding mode

Transmitting the FNS signal from the main body [1], the stacker entrance motor (M13) turns ON and rotates in high speed.

M13 rotates in low speed [2] to transfer the paper in low speed when the stacker entrance sensor (PS5) detects the trailing edge of the paper. M13 rotates in high speed and stands by for the subsequent paper after a specified period of time since it rotates in low speed.

M13 stops after completing the alignment operation of the last paper of the copy [3] and the movement of the saddle stitching stopper to the tri-folding position [4].

M13 turns ON and rotates in high speed to stand by for the subsequent paper when the folding paper exit sensor (PS25) detects the trailing edge of the paper bundle [5].



[1] FNS start signal turned ON

[2] Paper transferred to the stacker in low speed

[3] Last paper of the copy

[4] Saddle stitching stopper moving to the tri-folding position

[5] Tri-folding paper exit operation

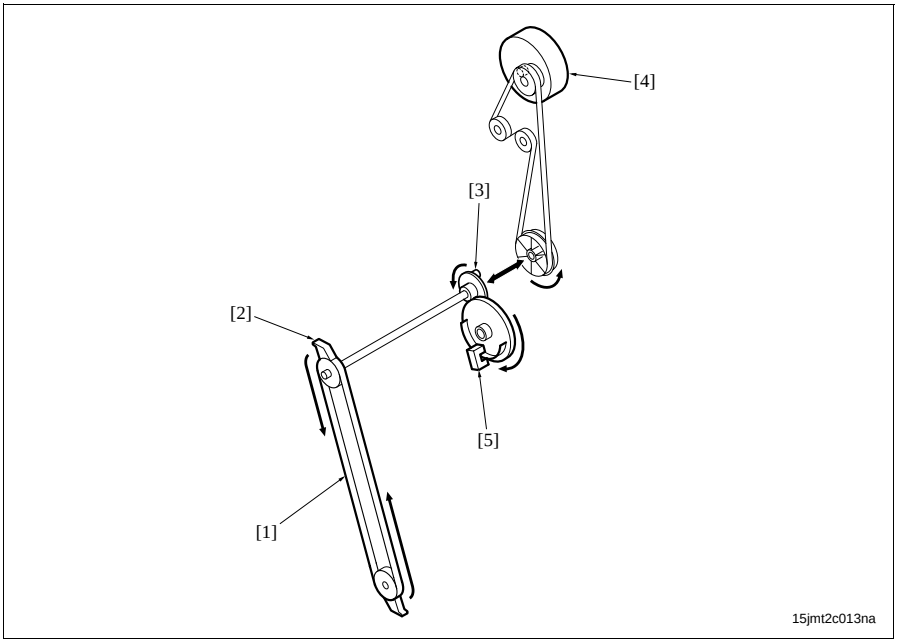
[6] Standing by for the paper of the subsequent copy

6.3.5 Stacker paper exit control

The paper exit roller motor (M7) controlled by the FNS control board (FNSCB) drives the paper exit belt of the stacker via the coupling gear.

A. Paper exit belt operation

The paper exit arm [2] mounted on the paper exit belt [1] exits the paper to the main tray in the stapling mode.
The paper exit roller motor (M7) [4] drives the paper exit belt via the coupling pin [3].
The paper exit belt home sensor (PS9) [5] detects the home position of the paper exit arm.



[1] Paper exit belt
[2] Paper exit arm
[3] Coupling pin
[4] Paper exit roller motor (M7)
[5] Paper exit belt home sensor (PS9)

B. Paper exit arm control

(1) Stapling mode (when the paper length is shorter than B5S in the sub scan direction)

Completing the stapling operation, the paper exit roller motor (M7) rotates to drive the paper exit belt in the stacker section. The paper exit arm lifts up the paper to the paper exit roller, and then the paper exit roller exits the paper to the main tray. M7 stops when the paper exit belt home sensor (PS9) turns ON.

(2) Stapling mode (when the paper length is B5S or longer in the paper feed direction)

Completing the stapling operation, the paper exit motor (M8) rotates. When the paper exit home sensor (PS12) detects the paper exit opening is closed, the paper exit roller motor (M7) rotates to drive the paper exit arm in the stacker section. The paper exit arm lifts up the paper to the paper exit roller, and then the paper exit roller exits the paper to the main tray.

M7 stops when the paper exit belt home sensor (PS9) turns ON.

(3) Folding/saddle stitching mode

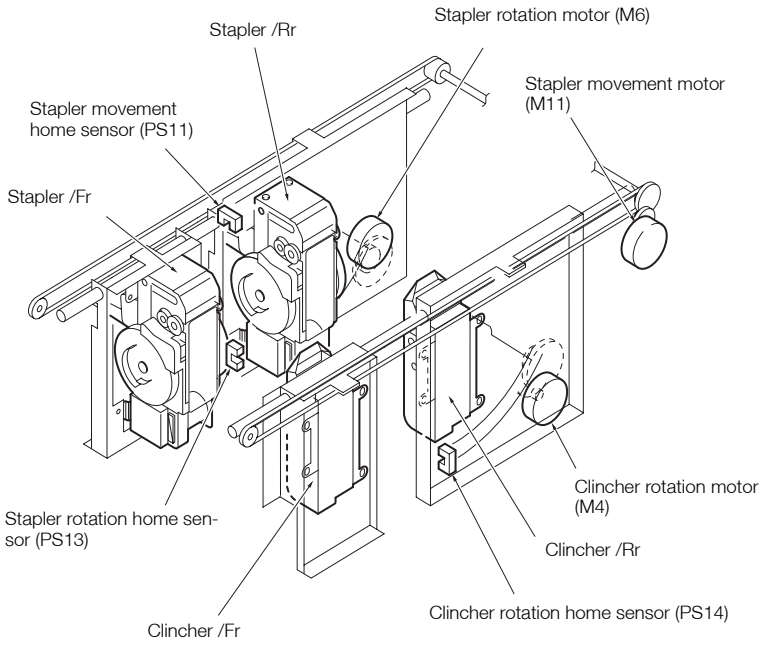
After completing the stapling operation, the saddle stitching stopper motor (M18) drives the saddle stitching stopper to move the paper to the folding position. To prevent the paper exit arm to contact with the paper standing by at the folding position, the paper exit arm does not rotate.

(4) Tri-folding mode

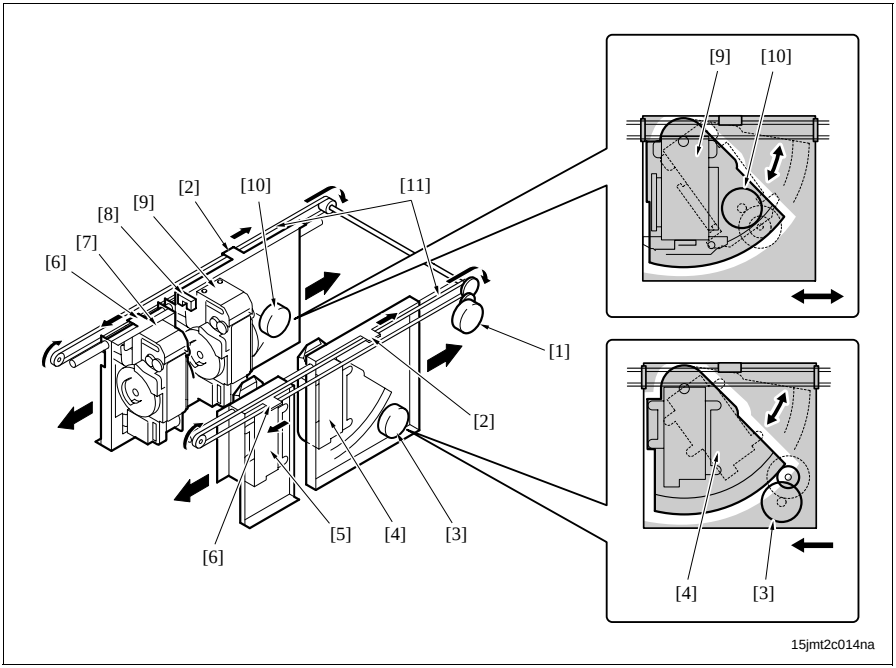
The paper exit roller motor (M7) rotates in the reverse direction to assist in transferring the paper to the tri-folding position after completing the paper alignment operation. M7 stops when the paper exit belt home sensor (PS9) turns ON.

7. STAPLER SECTION

7.1 Composition



7.2 Drive



[1] Stapler movement motor (M11)
[2] Upper side of the timing belt
[3] Clincher rotation motor (M4)
[4] Clincher /Rr
[5] Clincher /Fr
[6] Lower side of the timing belt
[7] Stapler /Fr
[8] Stapler movement home sensor (PS11)
[9] Stapler /Rr
[10] Stapler rotation motor (M6)
[11] Timing belt

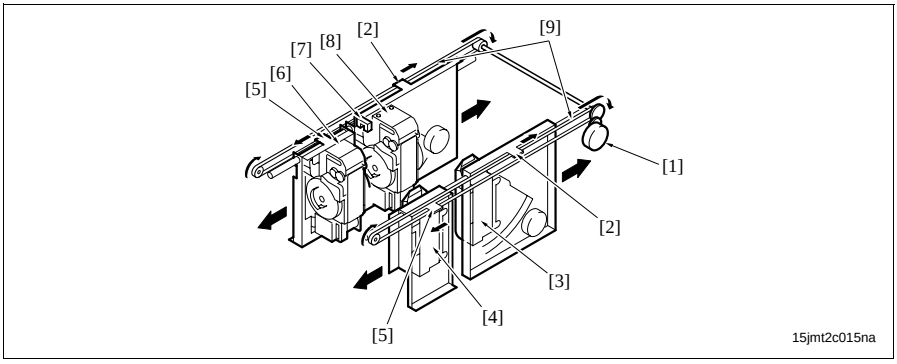
7.3 Operation

7.3.1 Stapler movement control

The staplers move in the horizontal direction for adjusting their distance. The stapler at the rear also rotates. The movement is made according to the stapling mode.

A. Horizontal movement operation

The stapler movement motor (M11) [1] moves the staplers in the horizontal direction.
The stapler /Rr [8] and the clincher /Rr [3] are mounted at the top [2] of the timing belt [9] and the stapler /Fr [6] and the clincher /Fr [4] are mounted at the bottom [5] of the timing belt.
The stapler movement home sensor (PS11) [7] detects the distance between the stapler and the clincher.



[1] Stapler movement motor (M11)
[2] Upper side of the timing belt
[3] Clincher /Rr
[4] Clincher /Fr
[5] Lower side of the timing belt
[6] Stapler /Fr
[7] Stapler movement home sensor (PS11)
[8] Stapler /Rr
[9] Timing belt

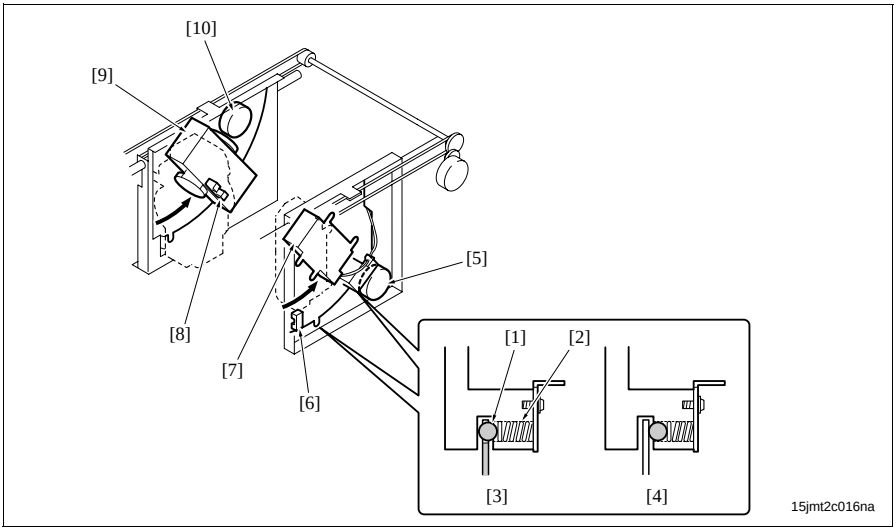
B. Rotational movement operation

The stapler /Rr and the clincher /Rr rotate 45° for performing 1 staple/one-corner stapling at rear.

The stapler rotation motor (M6) [10] rotates the stapler /Rr [9] and the clincher rotation motor (M4) [5] rotates the clincher /Rr [7].

The ball rock mechanism that consists of the ball [1] and the spring [2] securely locks the stapler and the clincher at 0° or 45°.

The illustrations [3] and [4] show the mechanism locked and unlocked respectively.



[1] Ball
[2] Spring
[3] Locked
[4] Unlocked
[5] Clincher rotation motor (M4)
[6] Clincher rotation home sensor (PS14)
[7] Clincher /Rr
[8] Stapler rotation home sensor (PS13)
[9] Stapler /Rr
[10] Stapler rotation motor (M6)

C. Stapler movement control

(1) Size movement in 1 staple/front and 2 staples

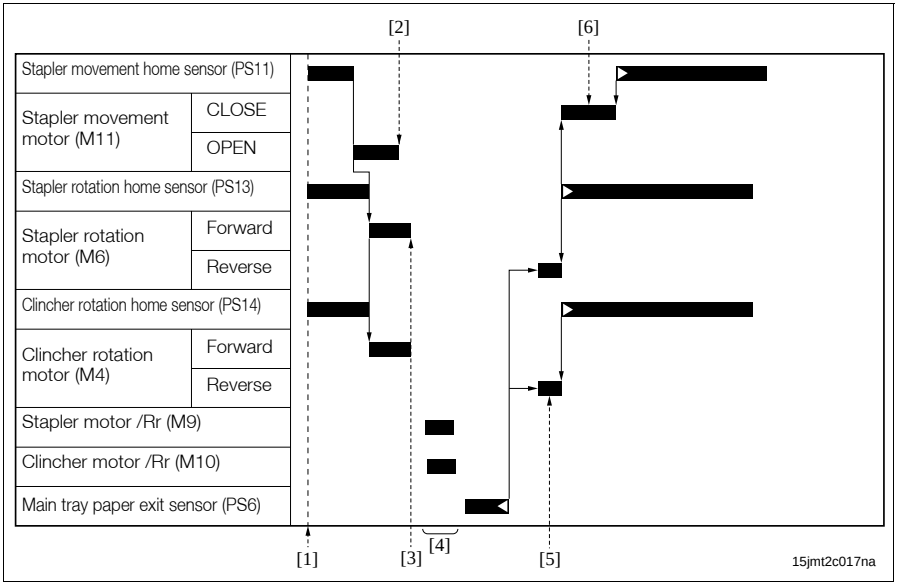
Transmitting the FNS signal from the main body, the stapler movement motor (M11) turns ON to widen the distance between stapler and clincher. It stops when they are positioned at the specified positions.

M11 turns ON after a specified period of time since the main tray paper exit sensor (PS6) detects the last paper. M11 stops when the stapler movement home sensor (PS11) turns ON.

(2) Size movement in 1 staple/one-corner stapling at rear

Transmitting the FNS signal from the main body [1], the stapler movement motor (M11) turns ON to widen the distance between the stapler and the clincher [2]. The stapler rotation motor (M6) and the clincher rotation motor (M4) turn ON to rotate the stapler /Rr and the clincher /Rr and move them diagonally [3] after a specified period of time since M11 turns ON.

M4 and M6 turn ON and rotate the stapler /Rr and the clincher /Rr to the home position [5] after a specified period of time since the trailing edge of the last paper passes the main tray paper exit sensor (PS6). The rotations are stopped when the stapler rotation home sensor (PS13) and the clincher rotation home sensor (PS14) turn ON. At the same time, M11 turns ON [6], and it stops when the stapler movement home sensor (PS11) turns ON.



[1] FNS start signal turned ON

[2] Stapler /Rr and clincher /Rr moving horizontally

[3] Stapler /Rr and clincher /Rr rotating 45°

[4] Stapling operation

[5] Stapler /Rr and clincher /Rr moving to the home position rotational

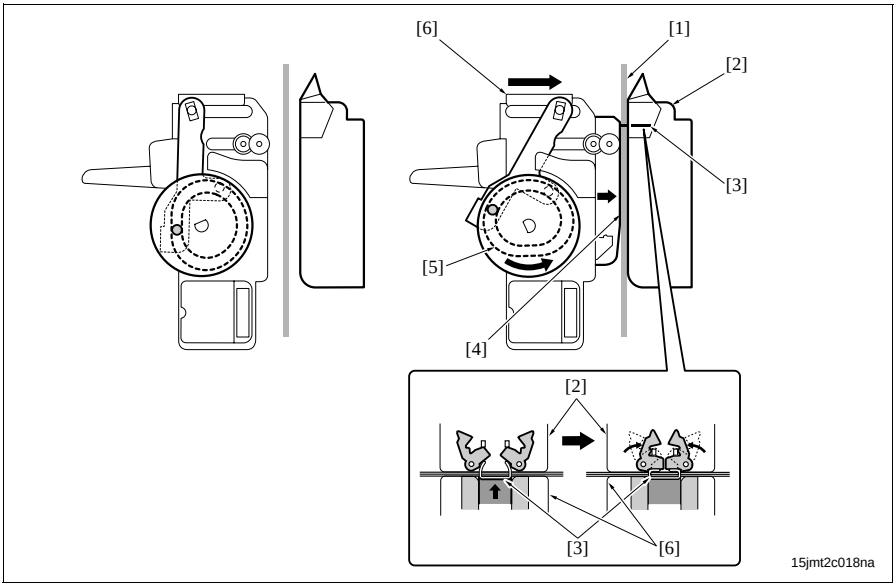
[6] Stapler /Rr and clincher /Rr moving to the home position horizontally

7.3.2 Stapler control

The stapling operation is performed by the stapler motors /Rr (M9) and /Fr (M14) and the clincher motors /Rr (M10) and /Fr (M15).

A. Stapling operation

In the stapling operation, the stapler motors /Rr (M9) and /Fr (M14) in the staplers /Rr and /Fr [6] push out the paper press section [4] to the clinchers [2] by the cam mechanism [5] to hold the paper [1] and punch out the staples [3]. Then, the clincher motors /Rr (M10) and /Fr (M15) in the staplers /Rr and /Fr bend the staples.



[1] Paper
[2] Clincher
[3] Staple
[4] Paper press section
[5] Cam mechanism
[6] Staplers /Rr and /Fr

B. Staple control

(1) Stapling

After completing the alignment operation of the alignment plate, the stapler motors /Rr (M9) and /Fr (M14) perform the stapling operation. After a specified period of time, the clincher motors /Rr (M10) and /Fr (M15) bend the staples.

The stapling operation is completed when the clincher motor home sensors /Rr (PS32) and /Fr (PS33) and the stapler motor home sensors /Rr (PS30) and /Fr (PS31) detect the home position and turn ON.

(2) Clogged staple detection

During the stapling operation, it is determined that the staple has been clogged and the stapler motors /Rr (M9) and /Fr (M14) and the clincher motors /Rr (M10) and /Fr (M15) rotate in the reverse direction to replace the staplers and the clinchers to the home positions if the stapler motor home sensors /Rr (PS30) and /Fr (PS31) and the clincher motor home sensors /Rr (PS32) and /Fr (PS33) do not turn ON after a specified period of time since they turn OFF.

(3) Cartridge detection

The cartridge set switches /Rr (SW1) and /Fr (SW3) detect the presence of a cartridge or the incorrect setting of a cartridge.

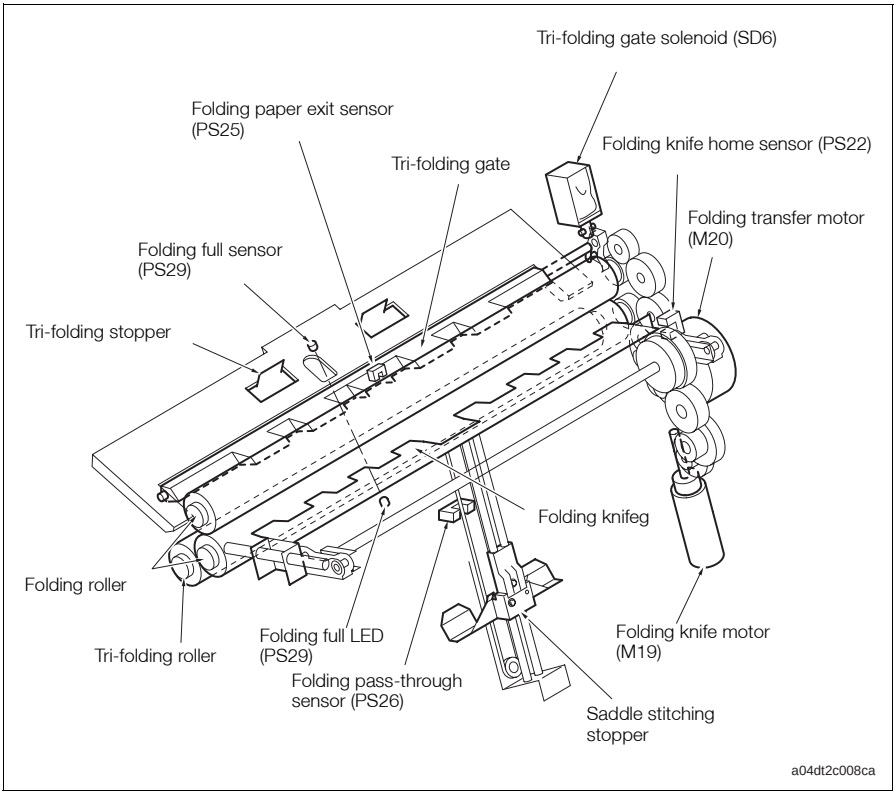
When no cartridge is set or it is set incorrectly, the main body displays the error message on its display panel.

(4) Staple detection control

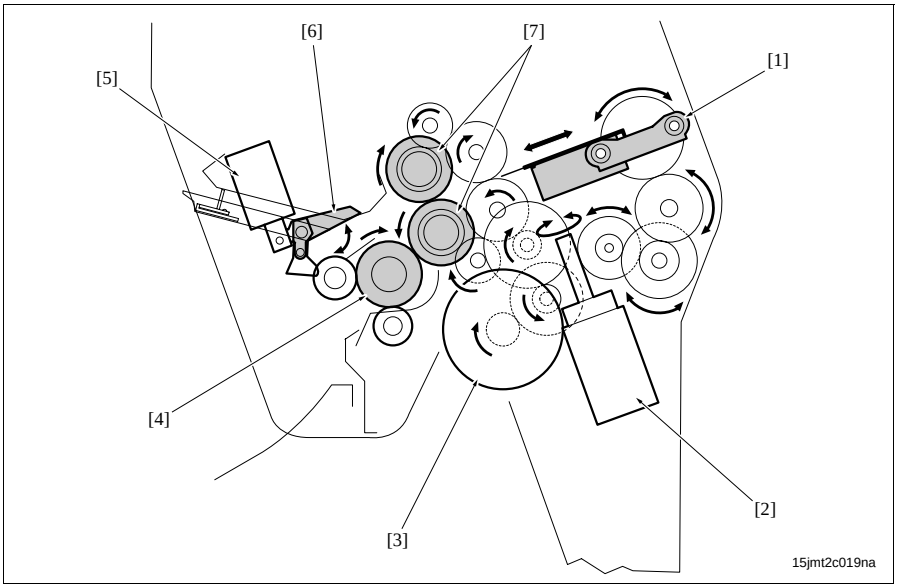
When the staples run out, the staple empty switches /Rr (SW2) and /Fr (SW4) turn ON and the main body displays the error message on its display panel.

8. FOLDING/SADDLE STITCHING/TRI-FOLDING SECTION

8.1 Composition



8.2 Drive



[1] Folding knife
[2] Folding knife motor (M19)
[3] Folding transfer motor (M20)
[4] Tri-folding roller
[5] Tri-folding gate solenoid (SD6)
[6] Tri-folding gate
[7] Folding roller

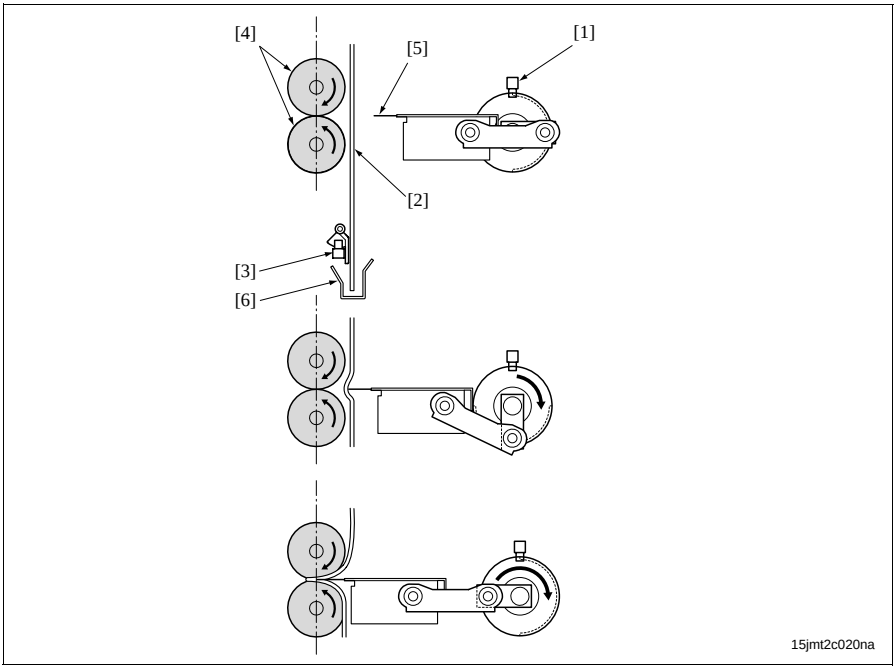
8.3 Operation

8.3.1 Folding knife control

The folding knife motor drives the folding knife. The folding knife is used in the folding/saddle stitching/tri-folding mode. In the tri-folding mode, it is used at the 1st folding.

A. Folding knife operation

The folding knife motor (M19) rotates the crank shaft a half turn via the gear and pushes the paper [2] to the nip section with the folding knife [5].
The folding rollers [4] draw and fold the paper.
The position of the saddle stitching stopper [6] controls the folding position.



[1] Folding knife home sensor (PS22)
[2] Paper
[3] Folding pass-through sensor (PS26)
[4] Folding roller
[5] Folding knife
[6] Saddle stitching stopper

B. Folding knife control

The folding knife motor (M19) turns ON and sticks out the folding knife to the paper after a specified period of time since the folding pass-through sensor (PS26) [3] detects the paper and the saddle stitching stopper stops at the folding position.
M19 stops when the folding knife reciprocates and the folding knife home sensor (PS22) [1] turns OFF.

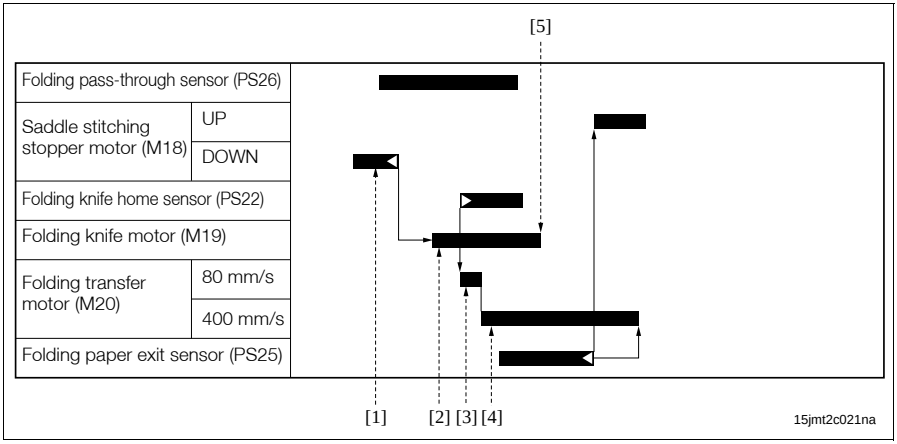
8.3.2 Folding transfer control

The folding transfer motor (M20) drives the folding roller. Then, the folding roller drives the tri-folding roller.

A. Folding transfer control

The folding knife motor (M19) turns ON [2] after a specified period of time since the folding pass-through sensor (PS26) detects the paper and the saddle stitching stopper stops at the folding position. When M19 turns ON the folding knife home sensor (PS22), the folding transfer motor (M20) turns ON [3] and drives the folding roller to perform the 1st folding and the tri-folding roller to perform the 2nd folding at the tri-folding operation, and then it exits the paper to the booklet tray.

M20 stops after a specified period of time since the folding paper exit sensor (PS25) detects the trailing edge of the paper bundle.



[1] Saddle stitching stopper moved

[2] Paper pressed to the folding roller by the folding knife

[3] Paper fold

[4] Paper transferred

[5] Standby position of the folding knife

B. Booklet full detection

The folding full sensor (PS29) that consists of the LED light emitting section and the light receiving section detects the booklet tray paper full.

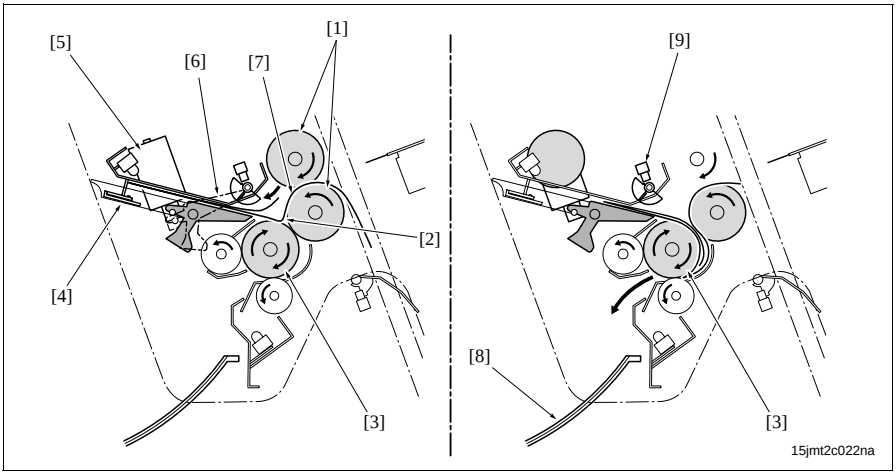
It determines the booklet tray is full if the exited paper shields the folding full sensor for the specified period of time.

8.3.3 Tri-folding gate control

The tri-folding gate switches between the folding/saddle stitching path and the tri-folding path. The tri-folding gate solenoid (SD6) drives the tri-folding gate.

A. Tri-folding 2nd folding operation

The tri-folding gate solenoid (SD6) [5] drives the tri-folding gate [6] to switch the paper path to the tri-folding path for leading the paper exited from the folding roller [1] to the tri-folding stopper [4].
To perform the 2nd folding, the loop [2] formed when the paper contacts with the tri-folding stopper are drawn between the folding roller and the tri-folding roller [3]. Then the paper is exited to the booklet tray [8].
The position of the tri-folding stopper determines the folding position in the 2nd folding.



[1] Folding roller
[2] Loop
[3] Tri-folding roller
[4] Tri-folding stopper
[5] Tri-folding gate solenoid (SD6)
[6] Tri-folding gate
[7] Paper
[8] Booklet tray
[9] Folding paper exit sensor (PS25)

B. Tri-folding gate control

After the saddle stitching stopper stops at the tri-folding position, the tri-folding gate solenoid (SD6) [5] turns ON and drive the tri-folding gate [6] to switch the paper path to the tri-folding stopper.
SD6 turns OFF after a specified period of time since the folding paper exit sensor (PS25) [9] detects the trailing edge of the paper bundle.

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KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

PI-502

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2006/09	1.0	—	Issue of the first edition

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PI-502

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

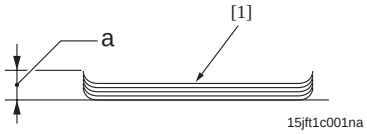
A. Type

Type	Torque limiter separation type seat feeding device

B. Functions

Auto sheet feeding (online operation)	Feeds the sheet to FS automatically under the instruction from the main body.
Manual sheet feeding (offline operation)	Feeds the sheet to FS under the instruction from the operation panel of PI. You can select the following 5 post processing modes: • 1 staple/back mode • 2 staples (flat-stapling) mode • Punch mode (when PK-512/513 is installed on FS) • Saddle stitching mode • Tri-folding mode **Note** • **The tray /Lw only supports the manual sheet feeding.**

C. Type of paper

Paper size	Tray /Up	A4, A4S, B5, B5S, A5 8½ x 11, 8½ x 11S, 5½ x 8½ 16K, 16KS Custom paper (Max.216 x 297 mm, Mln. 182 x 139 mm)
	Tray /Lw	A3, B4, SRA4S, A4, A4S, B5, B5S, A5 12 x 18, 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½ 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS Custom paper (Max.314 x 458 mm, Mln. 182 x 139 mm)
Paper type	Plain paper, recycle paper, color paper, special paper, coated paper, high-quality paper	
Paper weight	50 to 200 g/m^2	
Capacity	Tray /Up, /Lw	200 sheets (80 g/m^2) or 30 mm or less in height
Paper curling	 a Curling: 10 mm or less [1] 5 papers	

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	24/5V DC (supplied from the main body)
Maximum power consumption	30W or less
Dimensions	511 (W) x 620 (D) x 220 (H) mm
Weight	Approx. 10.5 kg

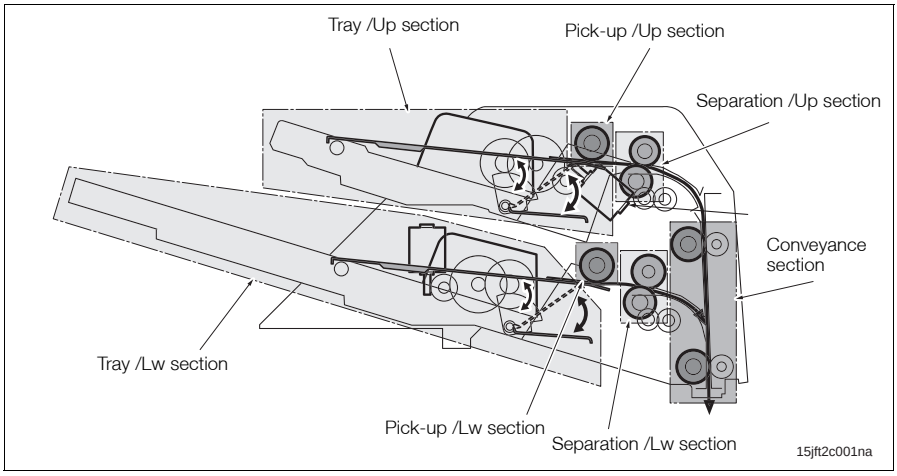
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

Note

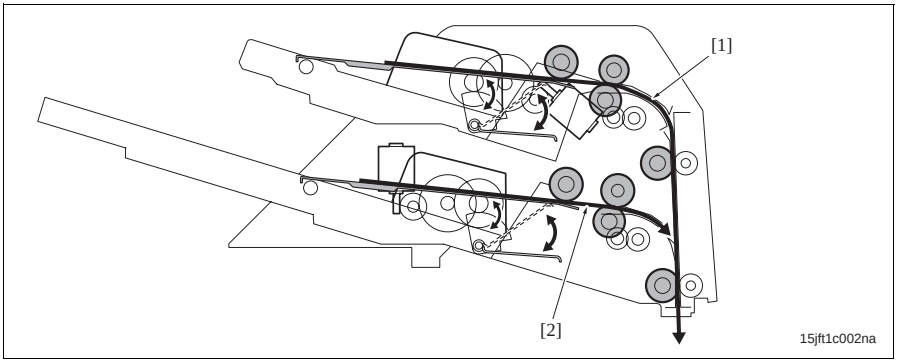
- **The information herein may be subject to change for improvement without notice.**

2. UNIT CONFIGURATION DIAGRAM



3. PAPER PATH

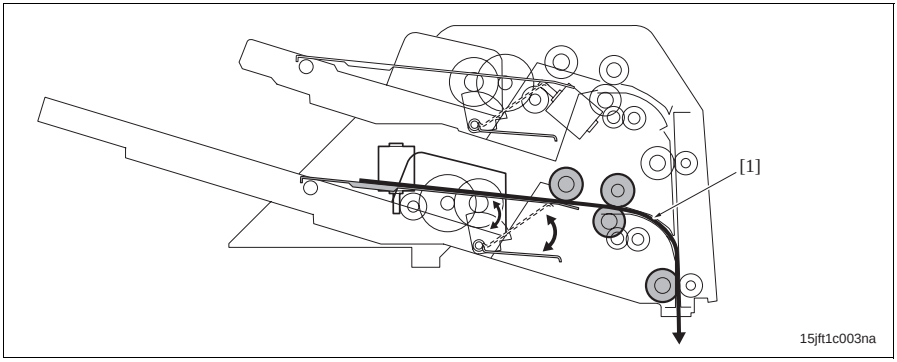
3.1 Auto sheet feeding (online operation)



[1] Paper path from the tray /Up

[2] Paper path from the tray /Lw

3.2 Manual sheet feeding (offline operation)

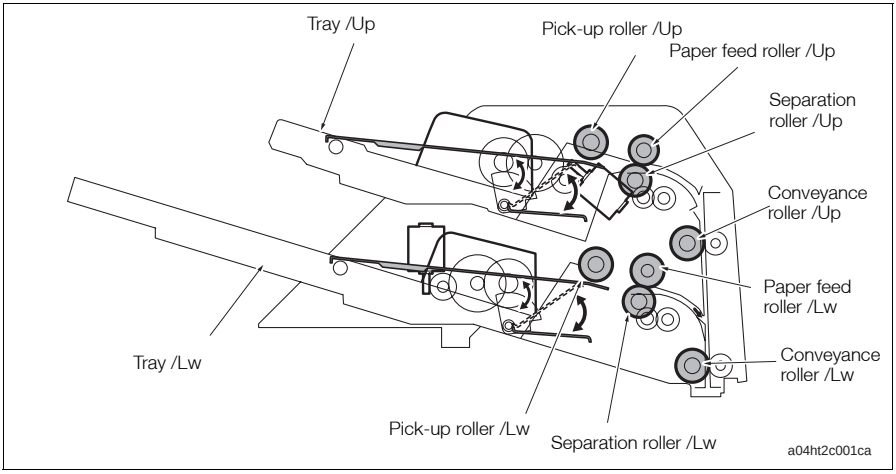


[1] Paper path from the tray /Lw

■ COMPOSITION/OPERATION

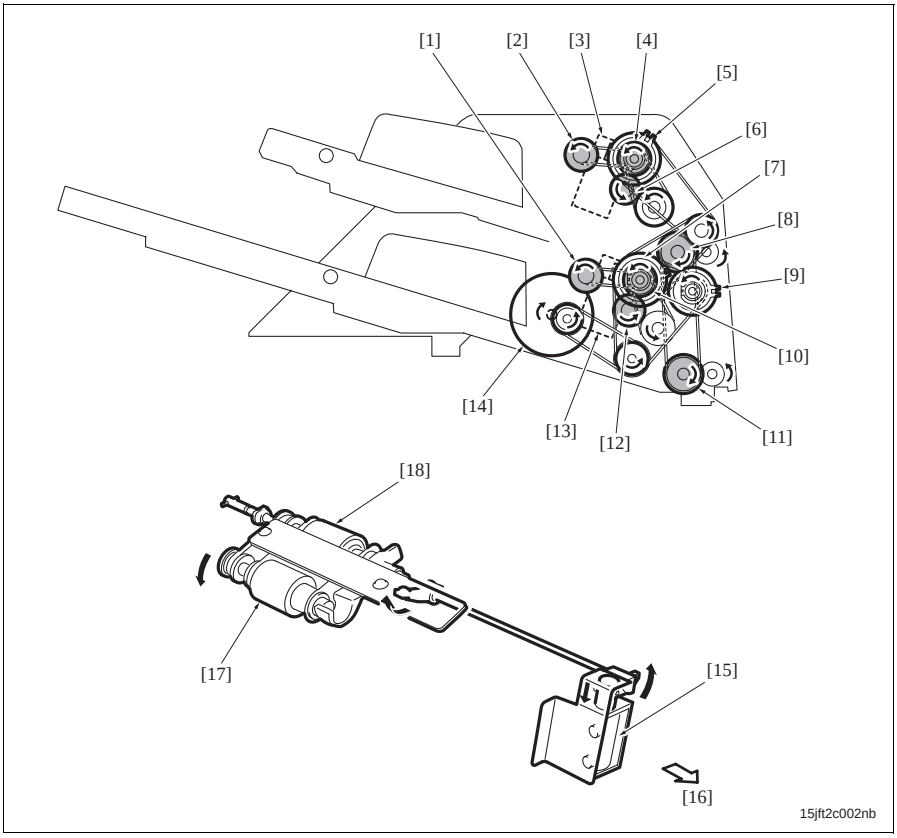
4. PAPER FEED SECTION

4.1 Composition



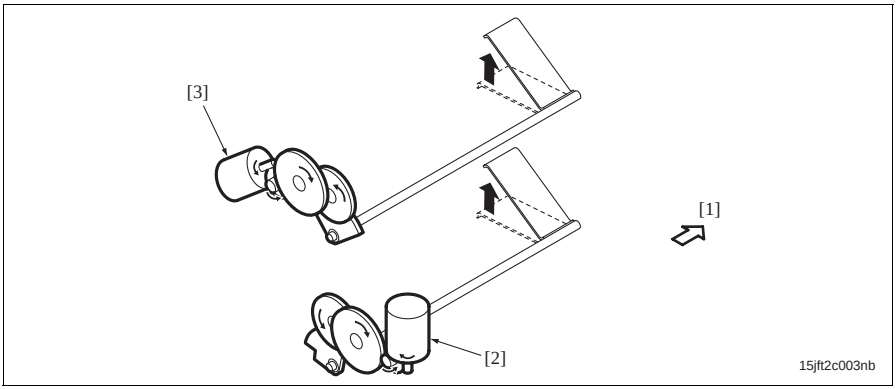
4.2 Drive

4.2.1 Paper feed drive



[1] Pick-up roller /Lw
[2] Pick-up roller /Up
[3] Pick-up solenoid /Up (SD201)
[4] Paper feed roller /Up
[5] Transfer clutch (MC201)
[6] Separation roller /Up
[7] Transfer clutch /Lw (MC202)
[8] Conveyance roller /Up
[9] Registration clutch (MC203)
[10] Paper feed roller /Lw
[11] Conveyance roller /Lw
[12] Separation roller /Lw
[13] Pick-up solenoid /Lw (SD202)
[14] Transfer motor (M203)
[15] Pick-up solenoid /Up (SD201), /Lw (SD202)
[16] Front
[17] Pick-up roller /Up and /Lw
[18] Paper feed roller /Up and /Lw

4.2.2 Tray lift drive



[1] Front
[2] Tray lift motor /Lw (M202)
[3] Tray lift motor /Up (M201)

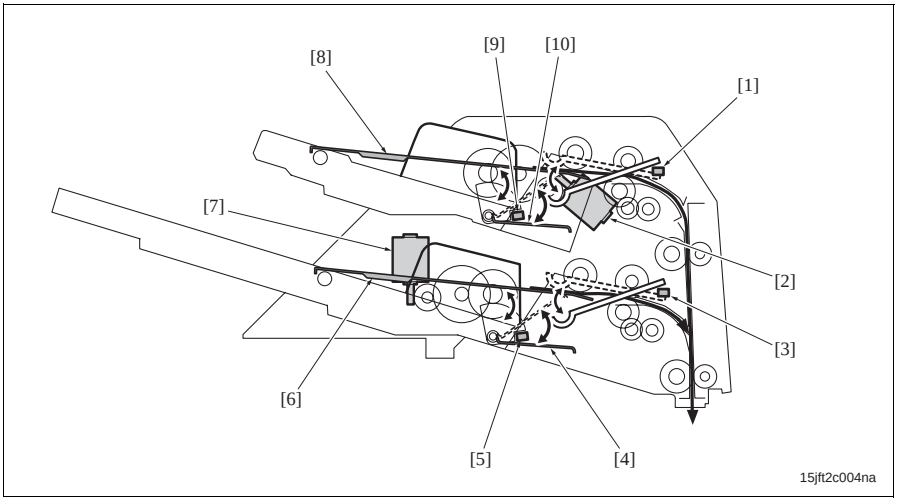
4.3 Operation

4.3.1 Tray lift mechanism

The tray lift motors /Up (M201) [2] and /Lw (M202) [7] move up and down the trays /Up and /Lw by rotating in the forward and reverse direction to drive the lift arms /Up [10] and /Lw [4] and move up and down the lift plates /Up [8] and /Lw [6], respectively.

At the upper limit positions, the tray upper limit sensors /Up (PS205) [1] and /Lw (PS209) [3] detect the actuators lifted up by the lift plates.

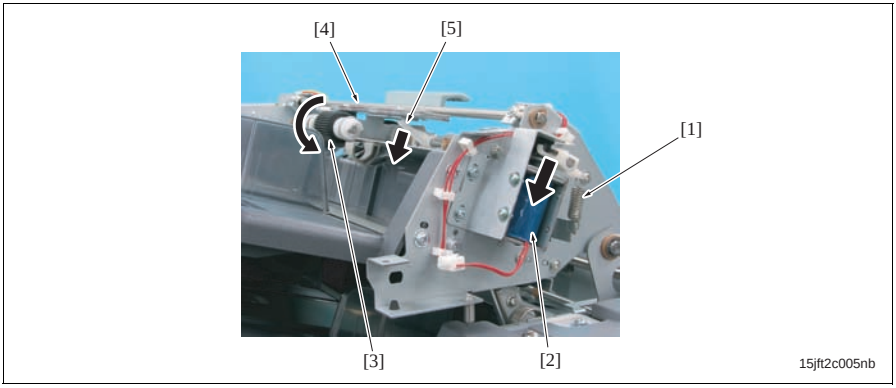
At the lower position of the tray, the tray lower limit sensors /Up (PS204) [9] and /Lw (PS210) [5] detect the actuators coupled with the lift arms /Up and /Lw.



[1] Tray upper limit sensor /Up (PS205)
[2] Tray lift motor /Up (M201)
[3] Tray upper limit sensor /Lw (PS209)
[4] Lift arm /Lw
[5] Tray lower limit sensor /Lw (PS210)
[6] Tray lift plate /Lw
[7] Tray lift motor /Lw (M202)
[8] Tray lift plate /Up
[9] Tray lower limit sensor /Up (PS204)
[10] Lift arm /Up

4.3.2 Pick-up mechanism

The pick-up solenoids /Up (SD201) [2] and /Lw (SD202) turn ON to pick up the paper. The release arm [5] held upward by the spring [1] lifts up the pick-up roller mounting plate [4] to release the pick-up roller [3]. When SD201 and SD202 turn ON, the release arm moves backward, and then the pick-up roller mounting plate and the pick-up roller fall down by their own weight. The pick-up roller driven by the transfer motor (M203) presses the paper and picks it up to transfer it to the separation section.

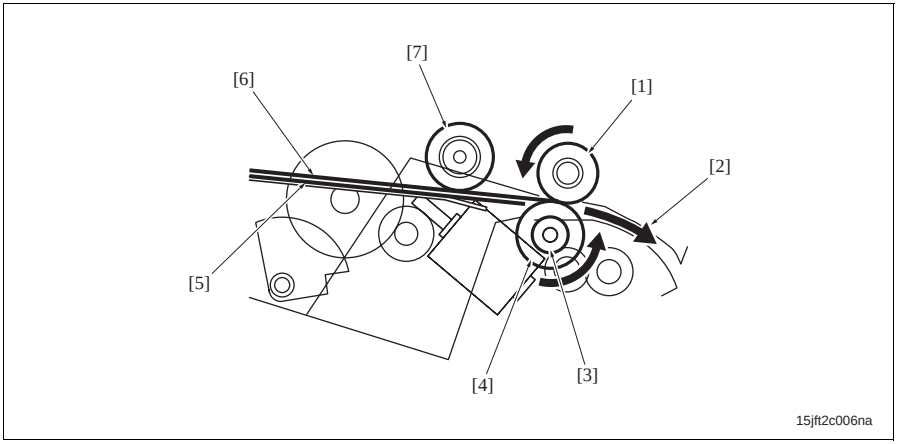


[1] Spring
[2] Pick-up solenoid /Up (SD201)
[3] Pick-up roller
[4] Pick-up roller mounting plate
[5] Release arm

4.3.3 Separation mechanism

The separation roller [4] is driven to rotate in the opposite direction from the paper transfer direction [2]. When transferring no or 1 sheet of paper, the separation roller rotates in the paper transfer direction to transfer the paper to the paper transfer section because the frictional force between the paper feed roller [1] or the paper and the separation roller [4] is stronger than the frictional force of the torque limiter [3].

When transferring 2 or more sheets of paper, the separation roller rotates in the reverse direction to prevent the bottom sheet from being transferred because the frictional force between the sheets is stronger than the frictional force of the torque limiter [3].



[1] Paper feed roller
[2] Paper transfer direction
[3] Torque limiter
[4] Separation roller
[5] 2nd sheet
[6] 1st sheet
[7] Pick-up roller

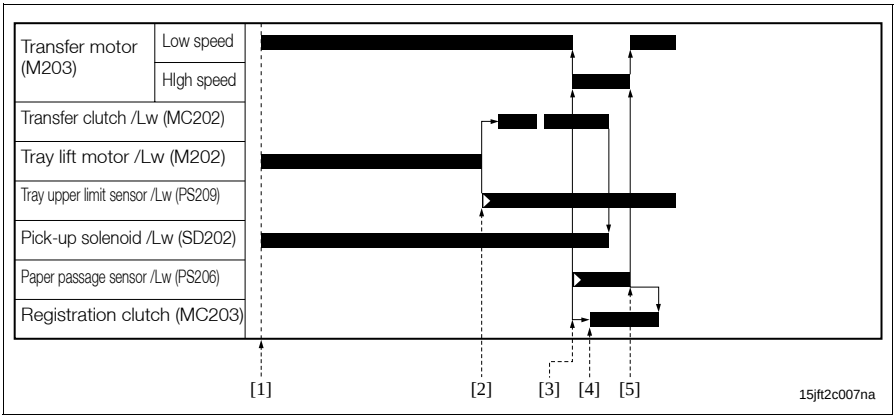
4.3.4 Registration control

Transmitting the FS start signal [1], the transfer motor (M203) rotates in low speed and the pick-up solenoids / UP (SD201) and /Lw (SD202) turn ON. At the time, the tray lift motors /Up (M201) and /Lw (M202) rotate in the forward direction to lift up the trays /Up and /Lw.

M201 and M202 stop when the tray upper limit sensors /Up (PS205) and /Lw (PS209) turn ON [2], and after a specified period of time, the transfer clutch /Up (MC201) and /Lw (MC202) turn ON and the paper is picked up from the tray. Only 1 sheet of paper is transferred by the transfer roller because of the separation roller.

M203 rotates in high speed when the paper reaches the paper passage sensors /Up (PS201) and /Lw (PS206) [3]. At the time, the paper is pressed against the transfer roller and forms a loop because the registration clutch (MC203) is OFF. After a specified period of time, MC203 turns ON [4] and M203 drives the paper to FS.

M203 switches to rotate in low speed to feed the subsequent paper since the paper passed PS201/PS206 [5], and then MC203 turns OFF after a specified period of time.



[1] FS start signal turned ON

[2] Tray reached at the upper limit

[3] Paper reached the paper passage sensors / Up (PS201) and /Lw (PS206)

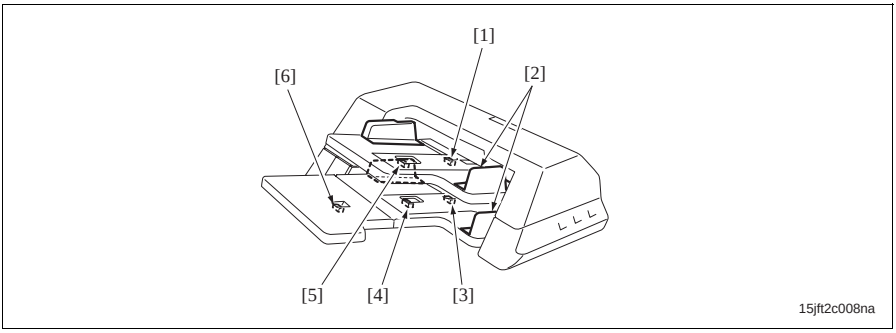
[4] Registration clutch (MC203) turned ON

[5] Trailing edge of the paper passed the paper passage sensors /Up (PS201) and /Lw (PS206)

4.3.5 Paper size detection control

The paper size VRs /Up (VR201) [1] and /Lw (VR202) [3] coupled with the side guide [2] detects the paper size in the main scan direction.

The paper set sensors /Up (PS203) [5] and /Lw (PS212) [4] and the L size sensor /Lw (PS208) [6] detects the paper size in the sub scan direction.



[1] Paper size VR /Up (VR201)
[2] Side guide plate
[3] Paper size VR /Lw (VR202)
[4] Paper set sensor /Lw (PS212)
[5] Paper set sensor /Up (PS203)
[6] L size sensor (PS208)

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

PK-512/513

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2006/09	1.0	—	Issue of the first edition

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PK-512/513

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

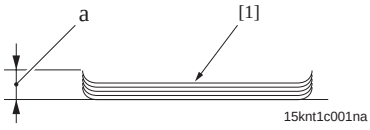
A. Type

Type	FS-integrated type punching operation device

B. Functions

Punching method	Stops and punches every paper
No. of holes	PK-512: 2 holes/3 holes (inch) or 2 holes/4 holes (metric) PK-513: 4 holes
Hole diameter	ϕ 6.5 mm (2 holes/4 holes), ϕ 8.0 mm (3 holes)
Hole pitch	PK-512: 80 mm (2 holes/4 holes), 108 mm (3 holes) PK-513: 21, 70, 21 mm
Supported mode	Punch mode, straight mode
Applicable post processing mode	Sort, group, staple

C. Type of paper

Paper size	PK-512 (2 holes): A3, B4, SRA4S, A4, A4S, B5, B5S, A5, A5S 11 x 17, 8½ x 14, 8½ x 11, 8½ x 11S, 5½ x 8½S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K, 16K, 16KS PK-512 (3 holes/4 holes): A3, B4, A4, B5 11 x 17, 8½ x 11 8K, 16K PK-513: A3, B4, A4, B5
Applicable paper	Plain paper, high quality paper, color paper, coated paper (same as the main body)
Paper weight	60 to 128 g/m^2
Punch prohibited paper	Label paper, tab paper, transparency film, 2nd base paper, holed paper, and the other paper that may interfere with the operation of the punch unit or the punch blade.
Paper curling	 a Curling (10 mm or less) [1] 5 sheets of paper

D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	24/5V DC (supply from the main body)
Maximum power consumption	40 W or less
Dimensions	130 (W) x 470 (D) x 115 (H) mm
Weight	Approx. 3 kg

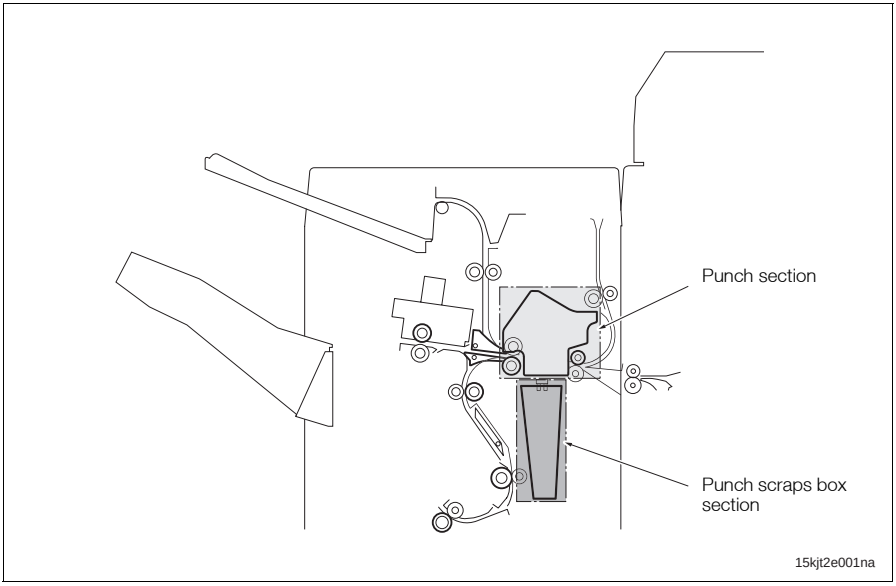
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80% RH (with no condensation)

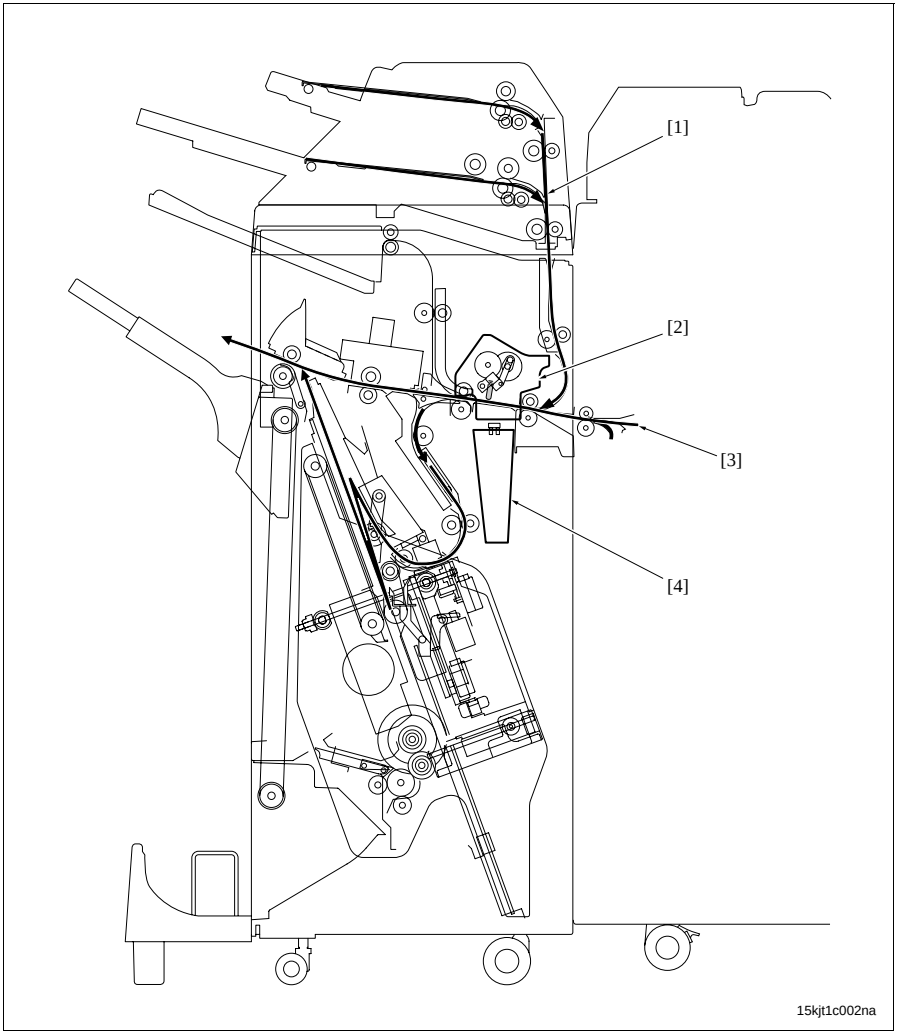
NOTE

- **The information herein may be subject to change for improvement without notice.**

2. UNIT COMPOSITION



3. PAPER PATH



[1] Paper path from PI

[2] Punch unit

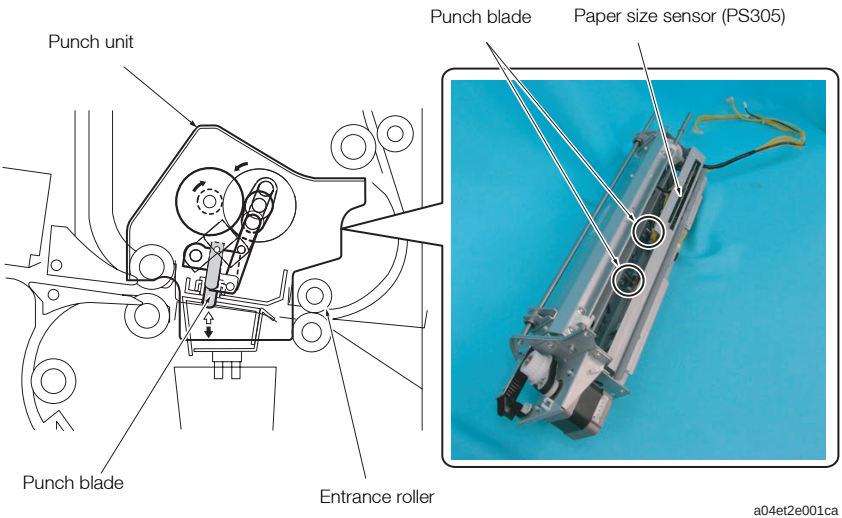
[3] Paper path from the main body

[4] Punch scraps box

■ COMPOSITION/OPERATION

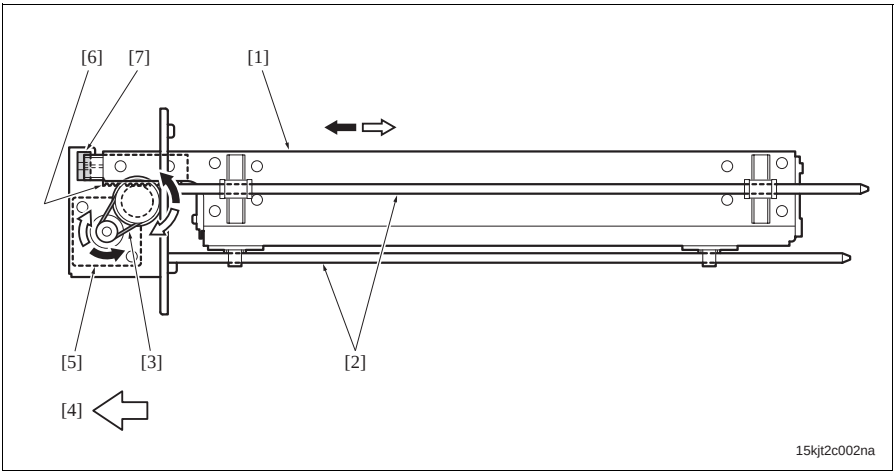
4. PUNCH SECTION

4.1 Composition



4.2 Drive

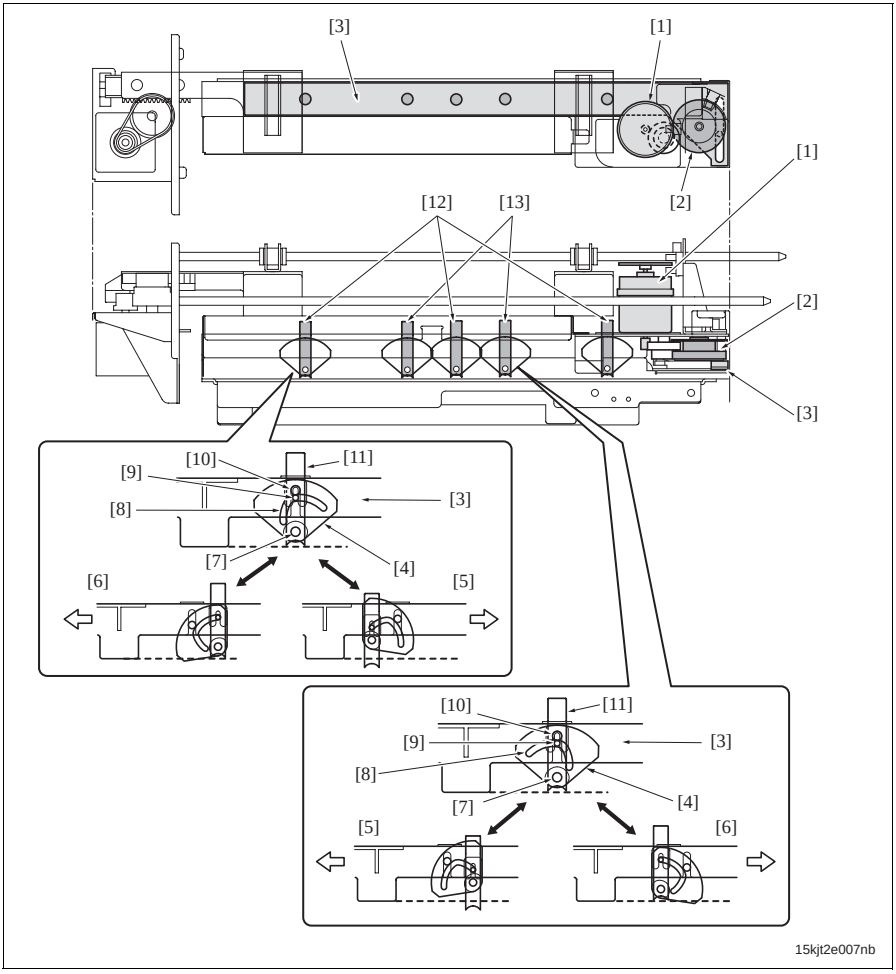
4.2.1 Punch shift drive



[1] Punch unit
[2] Guide shaft
[3] Belt
[4] Front
[5] Punch shift motor (M302)
[6] Rack
[7] Punch shift home sensor (PS303)

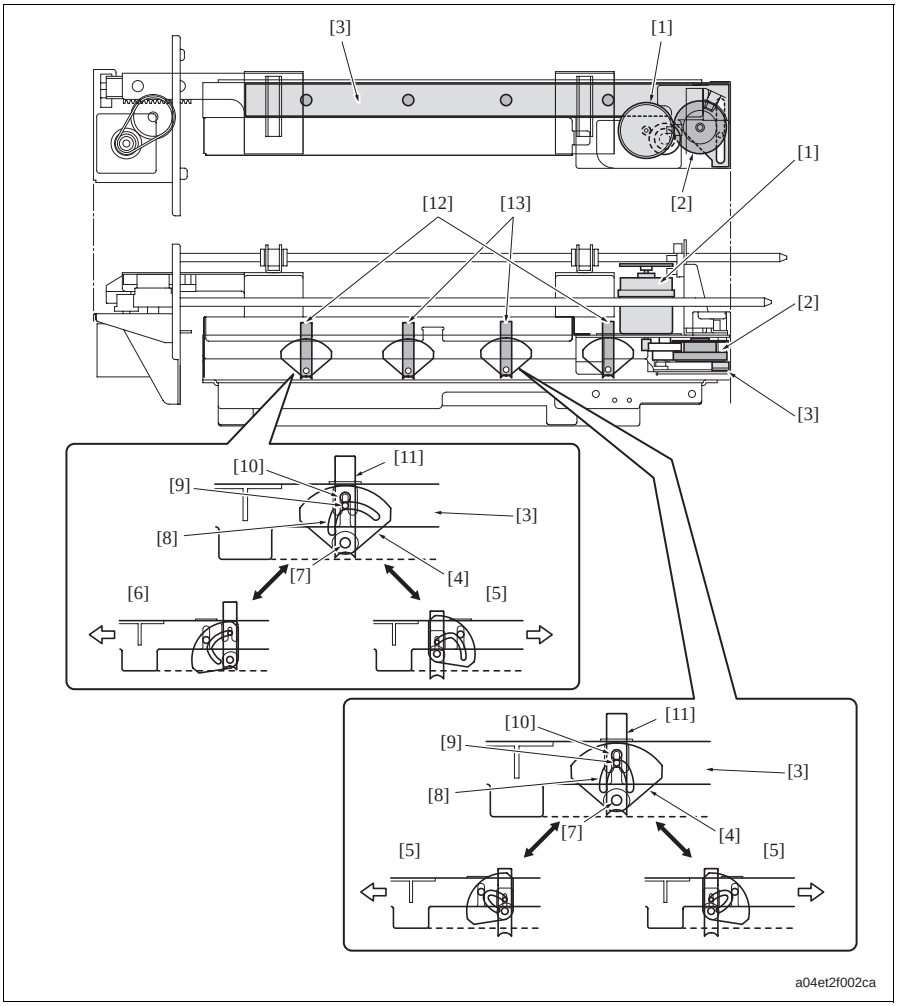
4.2.2 Punch drive

A. PK-512 (2 to 3 holes)



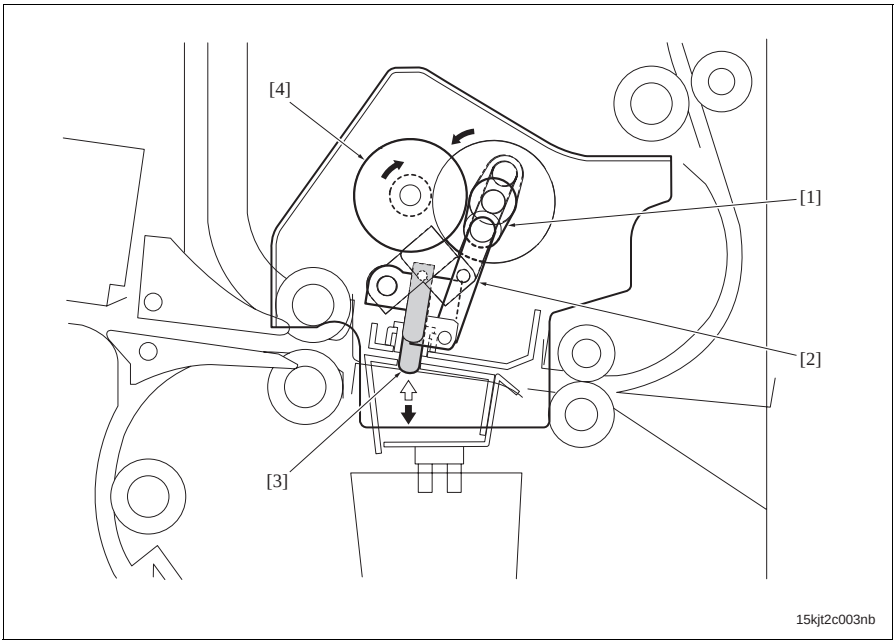
[1] Punch motor (M301)
[2] Eccentric cam
[3] Slide link
[4] Switching cam
[5] When the punch blade is driven
[6] When the punch blade is not driven
[7] Switching cam shaft
[8] Groove of the switching cam
[9] Projection of the punch blade
[10] Projection of the switching cam
[11] Punch blade
[12] Punch blade of the 3-hole punch
[13] Punch blade of the 2-hole punch

B. PK-512 (2 to 4 holes)



[1] Punch motor (M301)
[2] Eccentric cam
[3] Slide link
[4] Switching cam
[5] When the punch blade is driven
[6] When the punch blade is not driven
[7] Switching cam shaft
[8] Groove of the switching cam
[9] Projection of the punch blade
[10] Projection of the switching cam
[11] Punch blade
[12] Punch blade of the 4-hole punch
[13] Punch blade of the 2-hole and 4 hole punch

C. PK-513



[1] Eccentric cam
[2] Drive arm
[3] Punch blade
[4] Punch motor (M301)

4.3 Operation

4.3.1 Punch standby position movement control

Turning ON the device, the punch shift motor (M302) rotates to move the punch unit [6] to the home position until the punch shift home sensor (PS303) turns ON.

Selecting the punch mode, M302 rotates to move the punch unit [6] so that the paper size sensor (PS305) [1] of the punch unit [6] is positioned 5 mm inward [2] from the side edge of the paper.

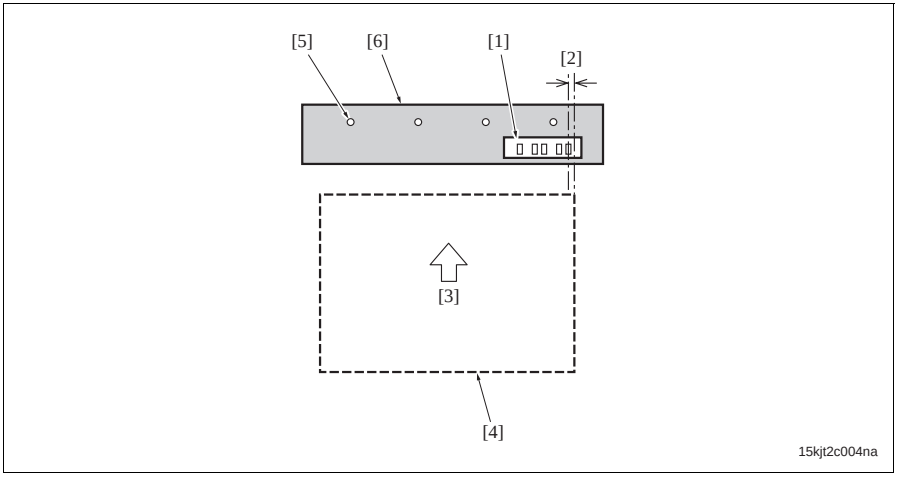
PS305 consists of 5 sensors. Each sensor detects the following paper.

Sensor	Paper size
1	A5S, 5½ x 8½S
2	B5S, 16KS
3	A4S, A5, 8½ x 11S, 8½ x 14S, 5½ x 8½, 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13
4	B4, B5, 8K, 16K
5	A3, A4, 11 x 17, 8½ x 11

* The sensors are numbered 1 to 5 from the front side

And, when the stand-by position is 5 mm for B5 and B4 paper sizes, the corner of the paper passes through below the punch hole and the stand-by position is changed to 1.5 mm to prevent the hitching of the paper.

The punch unit returns to the home position at the end of the job.



[1] Paper size sensor (PS305)
[2] Moving distance from the paper edge
[3] Paper transfer direction
[4] Paper
[5] Punch blade
[6] Punch unit

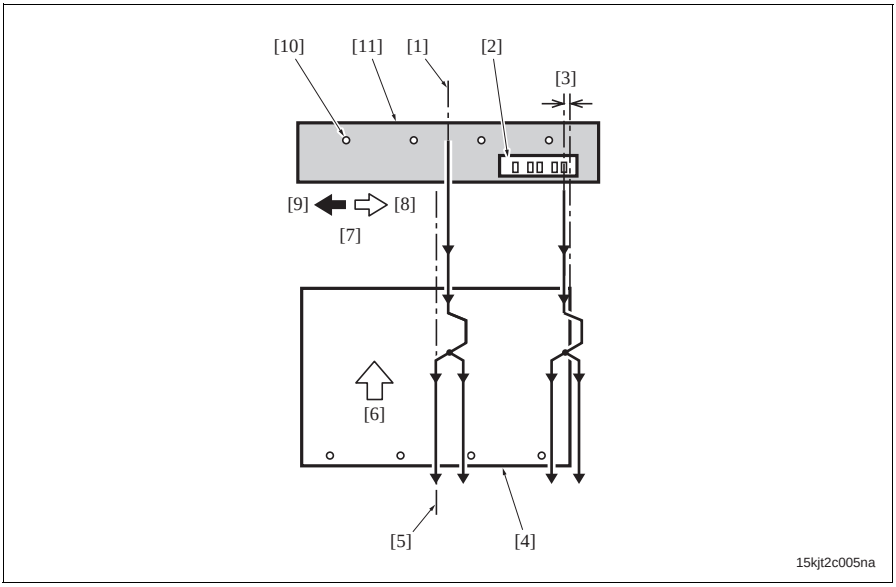
Note

- **In the model PK-512, the paper size sensor (PS305) is positioned on the front side and its operation is contrary to that in the above illustration on the right and left sides.**

4.3.2 Punch position correction control

For the punch unit positioned from the side edge of the paper to the inside (see "4.3.1 Punch standby position movement control"), the punch position is adjusted in the following procedure so that punching is made symmetrically to the center of paper at all times. The punch position correction is operated by moving the punch unit back and forth while conveying the paper.

- When the FNS entrance sensor (PS4) detects the leading edge of the paper, the punch unit [11] is moved to the rear side until the paper size sensor (PS305) [2] detects the side edge of the paper. If you conduct the punch operation on the paper conveyed from PI, it is started when the paper entrance sensor /Up (PS201) or /Lw (PS206) detects the leading edge of the paper.
- Then, the punch unit [11] is moved to the front side until PS305 [2] detects the side edge of the paper (the side edge reference position detection).
- Once it detects the side edge reference position [3], the punch unit is moved further [11] so that the center of the punch blade [1] is positioned to the center of the paper [5]. The moving distance and its direction are depending on the paper size. It is stopped temporarily at the side edge reference position if it is moved to the rear side.



[1] Center of the punch blade
[2] Paper size sensor (PS305)
[3] Side edge reference position
[4] Paper
[5] Center of the paper
[6] Paper transfer direction
[7] Punch unit moving direction
[8] Rear side
[9] Front side
[10] Punch blade
[11] Punch unit

Note

- **In the model PK-512, the paper size sensor (PS305) is positioned on the front side and its operation is contrary to that in the above illustration on the right and left sides.**

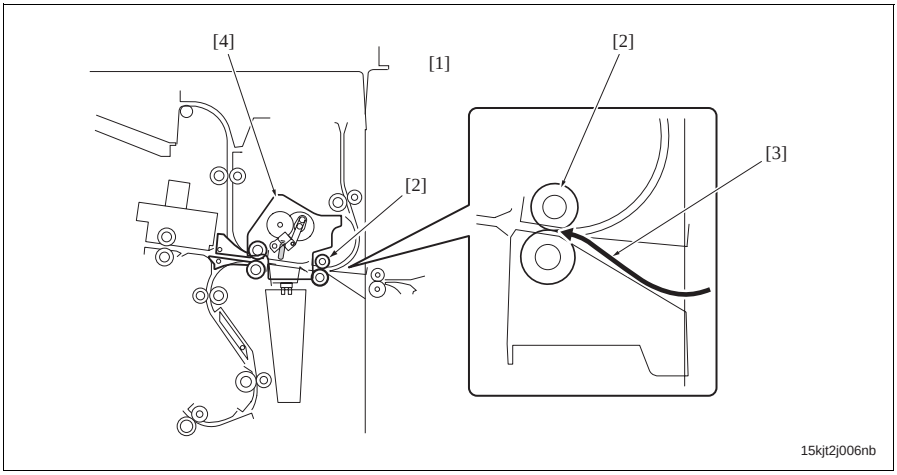
4.3.3 Punch control

A. Registration loop control

The FNS conveyance motor (M1) turns OFF temporarily to stop conveyance of paper when the specified time has passed since paper exit sensor (PS13) detected the leading edge of the paper. Thus the paper is pressed against the entrance roller forming a loop to correct the bend. When the specified time has passed, M1 turns ON to restart conveying the paper.

The above operation is not performed when conveying a large paper (220 mm and longer in the sub scan direction) and in the non-punching mode.

When punching the paper conveyed from PI, the loop is formed on the PI's side. For details, refer to PI-502 SHB.



[1] Main body
[2] Entrance roller
[3] Loop
[4] PK

B. Punch control (PK-512)

The FNS transfer motor (M1) is driven by the main body start signal.

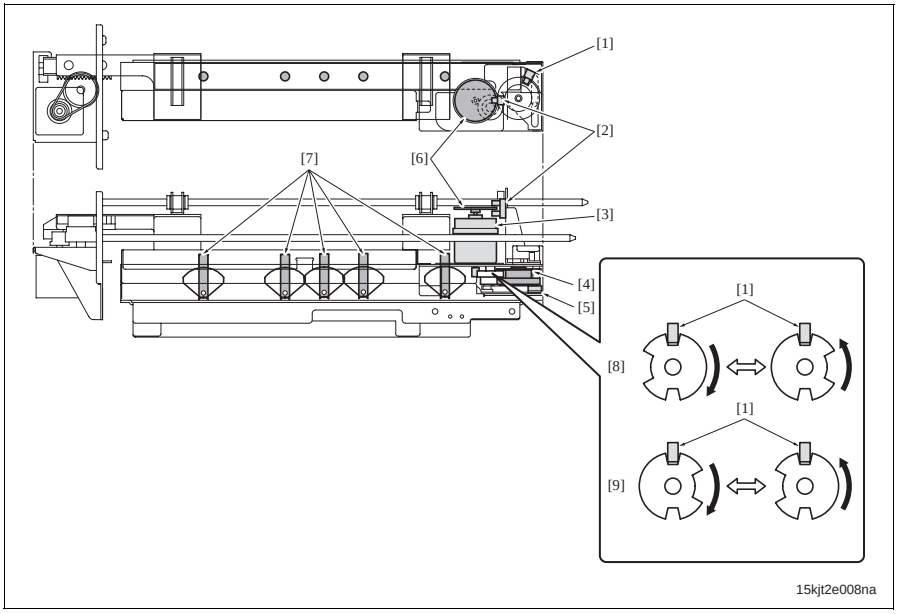
In the punching mode, the motor M1 stops temporarily after the FNS entrance sensor (PS4) detects the rear edge of paper. At the same time, the punch motor (M301) [3] rotates in the direction according to the number of punched holes. Number of punched holes of PK-512 is switched between 2 to 4 and 2 to 3 holes depending on the country. The motor M301 drives the slide link in the main scanning direction through the eccentric cam. As a result, the projection of the switching cam is pushed in the slide link moving direction and the switching cam is rotated around its axis. And then the punching blade [7] lowers to punch a hole. The projection of the punch blade is fitted into the groove of the switching cam.

Moving distance of the slide link [5] is controlled by detecting the eccentric cam actuator [4] with the punch home sensor (PS301) [1]. When the actuator rotates 180 degrees, first punching is completed. In the second punching, M301 is reversed. When the actuator reverses 180 degrees, punching is completed. Forward and reverse rotations are repeated alternately.

The rotating speed of M301 is controlled by detecting the rotation of the punch encoder plate [6] fixed to the axis of M301 with the punch encoder sensor (PS306) [2].

Then, M301 reverses and the punch home sensor (PS301) [1] returns to ON and the M301 stops finally.

When a specified time elapsed after M1 stops temporarily, M1 resumes rotating and paper is transferred.



[1] Punch home sensor (PS301)
[2] Punch encoder sensor (PS306)
[3] Punch motor (M301)
[4] Actuator
[5] Slide link
[6] Punch encoder plate
[7] Punching blade
[8] Operation of 3-hole punching in the 2 to 3 hole mode and 4-hole punching in the 2 to 4 hole mode
[9] Operation of 2-hole punching in the 2 to 3 hole mode and 2-hole punching in the 2 to 4 hole mode

(1) 2 to 3 holes mode

In the 2 to 3 punched hole mode, the groove of the switching cam of the 3-hole punching blade is shaped so that the rear side is concentric with the rotating axis and the front side is curved toward the rotating axis. For this reason, when the switching cam is rotated clockwise, the punching blade is driven downward and when the cam is rotated counterclockwise, the punching blade is not driven. The shape of the groove of the punching blade for 2 holes is contrary to it on the right and left sides. When the switching cam is rotated counterclockwise, the punching blade is driven.

(2) 2 to 4 holes mode

In the 2 to 4 holes mode, the 2 punching blades at both ends are driven only when the switching cam is rotated clockwise in the same way as in the 2 to 3 hole mode. As the 2 punching blades at the center should be driven in both cases of 2 or 4 hole punching, shape of the groove of the switching cam is symmetrical on the right and left sides and both the front and rear sides are curved in the rotating axis direction.

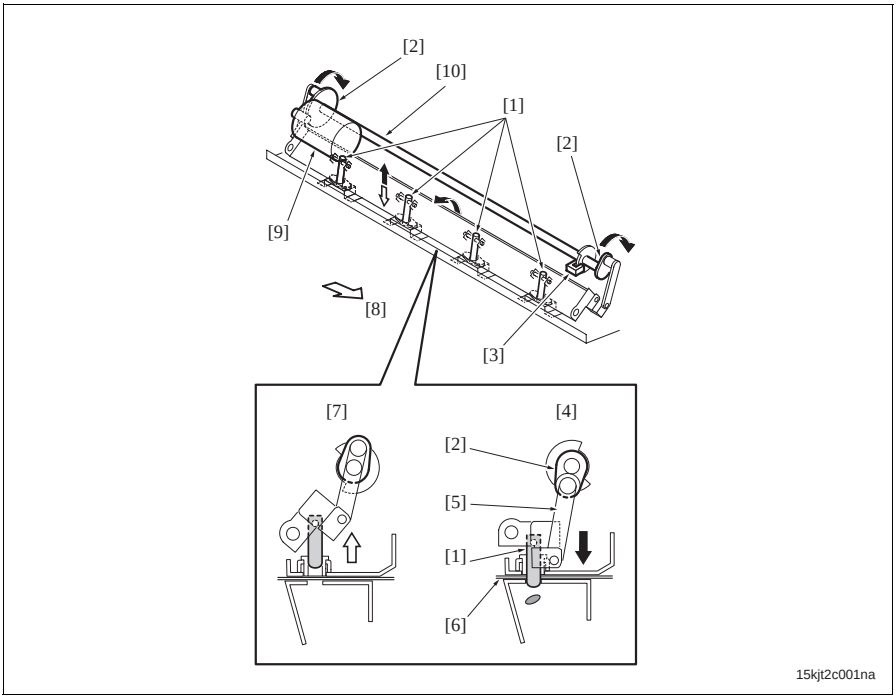
C. Punch control (PK-513)

Transmitting the start signal from the main body, the FNS conveyance motor (M1) rotates.

In the punch mode, M1 stops temporarily a specified period of time after the FNS entrance sensor (PS4) detects the trailing edge of the paper.

At the same time, the punch motor (M301) [9] drives the shaft [10] to rotate a full circle. The eccentric cams [2] rotate in sync with the shaft to move down the punch blade [1] to conduct the punch operation. M301 stops and the punch operation is completed when the punch home sensor (PS301) [3] turns ON.

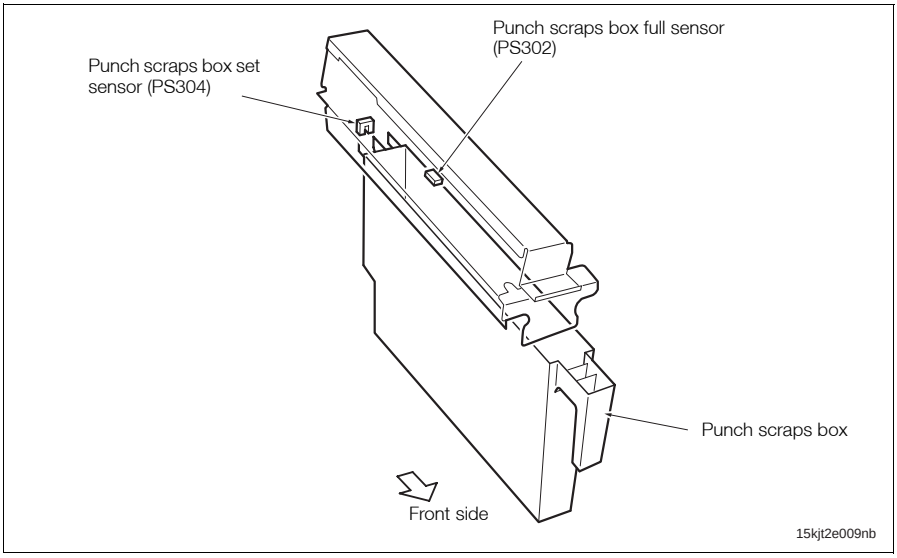
M1 rotates again to convey the paper a specified period of time after it stops temporarily.



[1] Punch blade
[2] Eccentric cam
[3] Punch home sensor (PS301)
[4] Punch blade at the lower position
[5] Drive arm
[6] Paper
[7] Punch blade at the upper position
[8] Front side
[9] Punch motor (M301)
[10] Shaft

5. PUNCH SCRAPS BOX SECTION

5.1 Composition



5.2 Drive

The punch scraps box section comprises no moving parts.

5.3 Operation

5.3.1 Punch scraps box control

A. Punch scraps box full detection

The punch scraps generated by the punch operation falls in the punch scraps box [3]. The punch scraps box full sensor (PS302) [1] turns ON and transmits the "no punch scraps box" information to the main body when the punch scraps box becomes full of punch scraps.

B. Punch scraps box detection

The punch scraps box set sensor (PS304) detects whether the punch scraps box is set or not. PS304 turns OFF and transmits the "no punch scraps box" information to the main body if the punch scraps box is not set.

KONICA MINOLTA

SERVICE MANUAL

Theory of Operation

SD-501

2006.09
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 2.0

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- To indicate clearly a section revised, show ⚠1 to the left of the revised section.
  A number within ⚠1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2006/09	2.0	⚠1	Revision in relation to launching of C6500
2005/04	1.0	—	Issue of the first edition

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■ OUTLINE

1. PRODUCT SPECIFICATIONS

A. Type

Type	Saddle stitching unit with fore-edge trimming and multi-folding function

B. Functions

(1) Functions

Subtray exit	Exits paper to the subtray without any process.
Coupling exit	Conveys paper to the succeeding device without any process.
Saddle stitching	Exits paper to the bundle exit tray after being center folding and saddle stitching.
Saddle stitching with trimming	Exits to the bundle exit tray after being center folding, saddle stitching, and trimming processes.
Multi center folding	Exits to the bundle exit tray after being center folding on one or more sheets of paper.
Multi letter folding	Exits to the tri-folding tray after being letter folding process on one or more sheets of paper.

(2) Maximum tray capacity

Subtray	200 sheets		
Bundle exit tray	Center folding/ trimming	sheet	set
		2 to 10	More than 50
		11 to 20	More than 30
		21 to 40	More than 20
		41 to 50	More than 15
	Multi center folding	30 sets	
Tri-folding exit tray	Multi letter folding	20 sets	

C. Type of paper

⚠ **(1) Coupling/subtray mode**

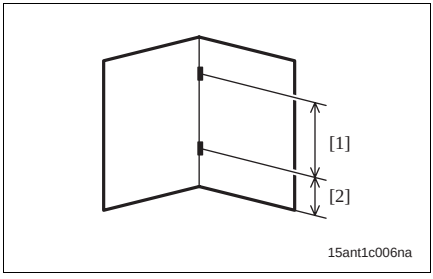
Paper size	SRA3*2, A3, B4, SRA4*2, SRA4S*2, A4, A4S, B5, B5S, A5, A5S*2, B6S*2, A6S*2 13 x 19*2, 12 x 18, 11 x 17, 8 1/2 x 14, 8 1/2 x 11, 8 1/2 x 11S, 5 1/2 x 8 1/2*1, 5 1/2 x 8 1/2S*2 8 1/2 x 13, 8 1/4 x 13, 8 1/8 x 13 1/4, 8 x 13 8K*3, 16K*3, 16KS*3 Tab paper*4 : A3, B4, A4, A4S, B5, B5S, 11 x 17, 8 1/2 x 11, 8 1/2 x 11S, custom size (Max. 324 x 460 mm, Min. 182 x 140 mm) Custom paper : 1050 (Max. 324 x 460 mm, Min. 182 x 140 mm), C6500 (Max. 330 x 487 mm, Min. 100 x 148 mm) Wide paper*1 : A3, B4, A4, A4S, B5, B5S, A5, 12 x 18, 11 x 17, 8 1/2 x 11, 8 1/2 x 11S, 5 1/2 x 8 1/2, size entry : (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China. *4 C6500: only A4 and 8 1/2 x11. Operation of paper exit with tab area at the trail edge side is not assured.
Paper weight	50 to 300 g/m^2

(2) Saddle stitching mode

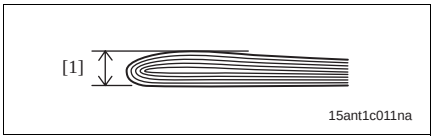
⚠	Paper size	SRA3*2, A3, B4, SRA4S*2, A4S, B5S 12 x 18, 11 x 17, 8½ x 14, 8½ x 11S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K*3, 16K*3 Custom paper : Max. 324 x 460 mm, Min. 182 x 257mm Wide paper*1 : A3, B4, A4S, B5S, 12 x 18, 11 x 17, 8½ x 11S, size entry: (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China.
	Paper weight	50 to 244g/m^2
⚠	Maximum saddle stitching sheets	Plain paper and coated paper:

Paper weight	Number of the sheets	
	Plain paper	Coated paper/ Color copy paper*1
50 to 81 g/m^2	50 *2	30 *2
82 to 91 g/m^2	30 *2	15 *2
92 to 130 g/m^2	20 *2	10 *2
131 to 161 g/m^2	15 *2	5 *2
162 to 209 g/m^2	10	—
210 to 244 g/m^2	5	—

*1 C6500 only
*2 One sheet can be switched to a thick paper (200 g/m^2)

	Staple position	Can be automatically changed (90 to 165 mm) in accordance with paper size.  [1] = [Paper size] /2 ± 2 mm [2] = [Paper size] /4 ± 2 mm

Folding height



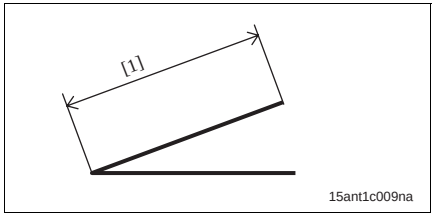
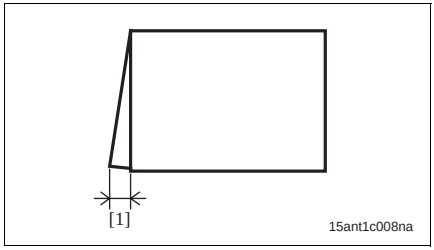
Folding sheets	[1] Folding height		
	A3 12 x 18 11 x 17 (401 mm or more)	B4 8½ x 14 (301 mm to 400 mm)	A4S 8½ x 11S (261 mm to 300 mm)
2 to 5	35 mm or less	40 mm or less	45 mm or less
6 to 15	45 mm or less	50 mm or less	Not defined
16 to 30	50 mm or less	55 mm or less	
31 to 50	60 mm or less	65 mm or less	

(The above information is applied when paper weight is 64 g/m^2 and no thick cover is not used.)

(3) Trimming mode

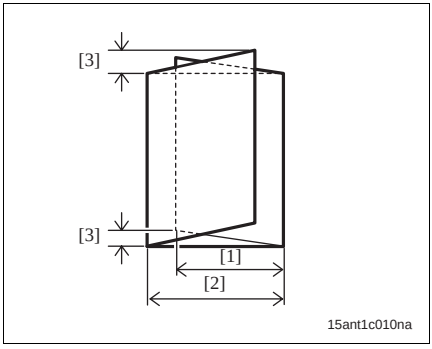
⚠	Paper size	SRA3*2, A3, B4, SRA4S*2, A4S, B5S 12 x 18, 11 x 17, 8 1/2 x 14, 8 1/2 x 11S 8 1/2 x 13, 8 1/4 x 13, 8 1/8 x 13 1/4, 8 x 13 8K*3, 16KS*3 Custom paper :1050 (Max. 324 x 460 mm, Min. 182 x 140 mm), C6500 (Max. 324 x 460 mm, Mln. 182 x 247 mm) Wide paper*1 : A3, B4, A4S, B5S, 12 x 18, 11 x 17, 8 1/2 x 11S, size entry: (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China.
	Paper weight	50 to 244 g/m^2
	Maximum trimming sheets	50 sheets (80 g/m^2) or 49 sheets (80 g/m^2) + 1 sheet (200 g/m^2) (The above is the number of the printed paper before folding. The number of fore-edge (after folding) is double.)

(4) Multi center folding mode

⚠	Paper size	SRA3*2, A3, B4, SRA4S*2, A4S, B5S 12 x 18, 11 x 17, 8½ x 14, 8½ x 11S 8½ x 13, 8¼ x 13, 8⅛ x 13¼, 8 x 13 8K*3, 16KS*3 Custom paper :1050 (Max. 324 x 460 mm, Min. 182 x 140 mm), C6500 (Max. 324 x 460 mm, Mln. 182 x 247 mm) Wide paper*1 : A3, B4, A4S, B5S, 12 x 18, 11 x 17, 8½ x 11S, size entry : (Max. 324 x 460 mm) *1 1050 only *2 C6500 only *3 C6500: supported in all the destinations. 1050: only supported in Taiwan and China.
	Paper weight	50 to 244 g/m^2
	Maximum folding sheets	Paper weight / Sheets 50 to 81 g/m^2 / 5 sheets 82 to 130 g/m^2 / 3 sheets 131 to 244 g/m^2 / 2 sheets
	Folding precision (for 1 sheet)	 [1] = [Paper size] /2 ± 1.5 mm  [1] = 1.5 mm or less

(5) Multi letter folding mode

Paper size	A4S, 8½ x 11S			
Paper weight	50 to 91 g/m^2			
Maximum folding sheets	Paper weight	Sheets		
	50 to 81 g/m^2	5 sheets		
	82 to 91 g/m^2	3 sheets		
Folding precision (for 1 sheet)	Original size	[1]	[2]	[3]
	A4S	97.5 ± 4 mm	102.0 ± 4 mm	1.5 mm or less
	8½ x 11S	91.6 ± 4 mm	96.1 ± 4 mm	



D. Maintenance

Maintenance	Same as the main body.
Machine service life	Same as the main body.

E. Machine data

Power source	AC100 to 240V, DC5V (DC5V is supplied from the main body)
Maximum power consumption	270 W
Dimensions	When the bundle exit tray is stored: 1,170 (W) x 775 (D) x 1,020 (H) mm When the bundle exit tray is pulled out: 1,170 (W) x 1,441 (D) x 1,020 (H) mm
Weight	Approx. 263 kg

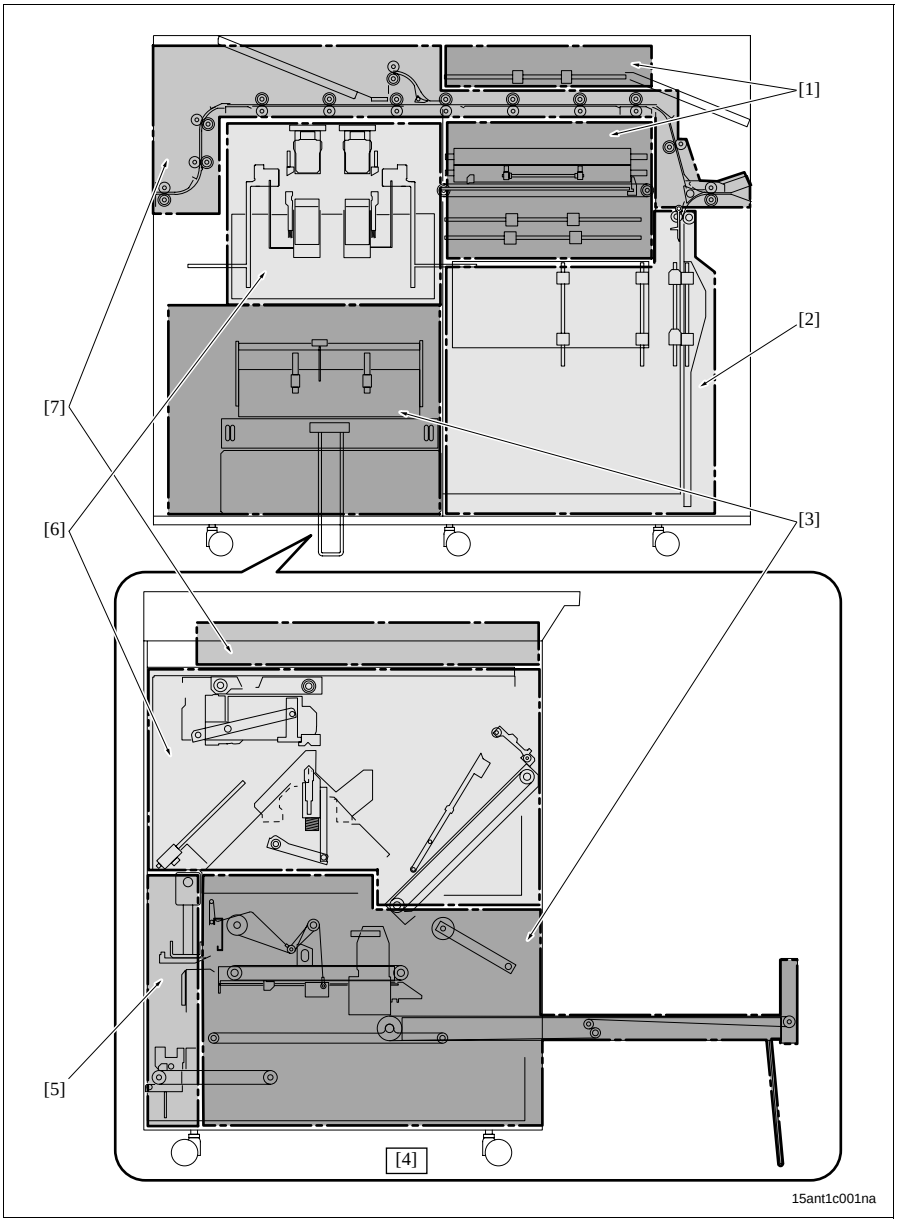
F. Operating environment

Temperature	10 to 30°C
Humidity	10 to 80%RH (with no condensation)

Note

- **The information herein may be subject to change for improvement without notice.**

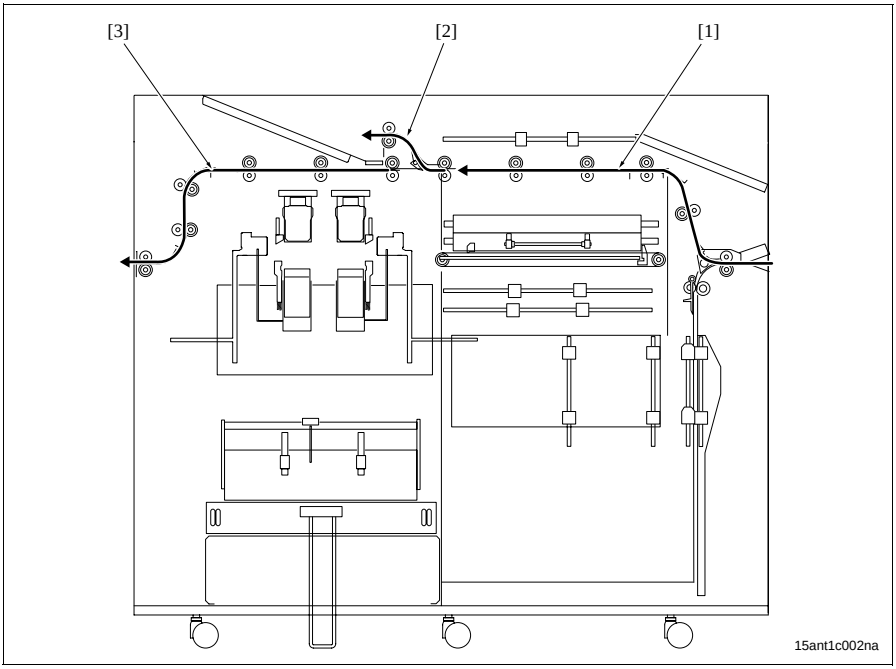
2. UNIT COMPOSITION



[1] Folding section
[2] Right angle conveyance section
[3] Bundle process section
[4] Left side view
[5] Trimmer section
[6] Saddle stitching section
[7] Horizontal conveyance section

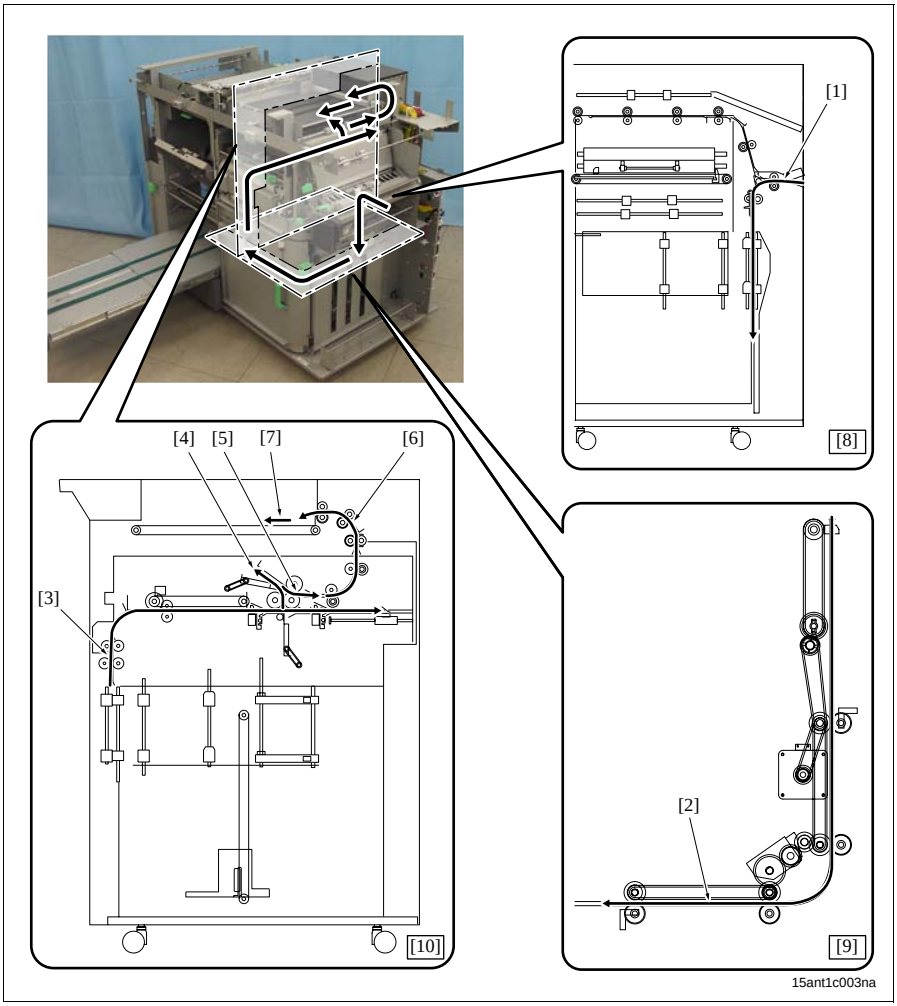
3. PAPER PATH

A. Coupling exit/subtray exit mode



[1] Horizontal conveyance
[2] Subtray exit
[3] Coupling exit

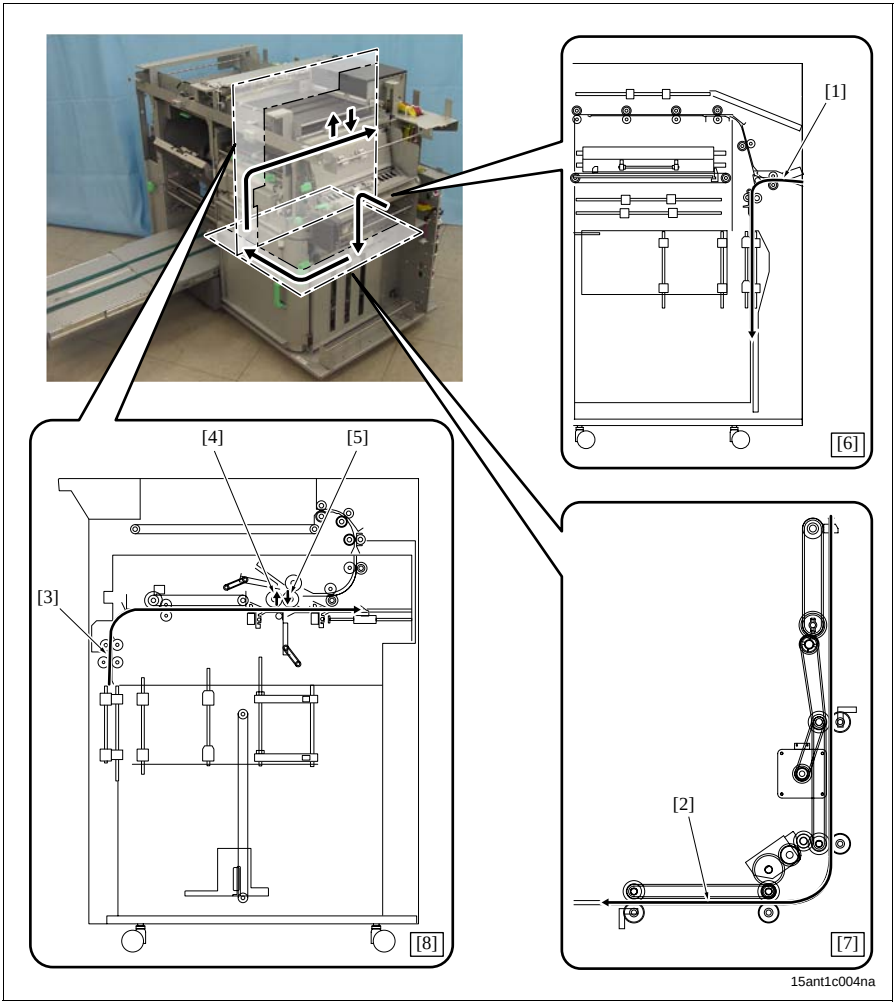
B. Multi letter folding mode



[1] Stack to the right angle conveyance section
[2] Right angle conveyance
[3] Conveyance to the folding section
[4] 1st folding
[5] 2nd folding
[6] Paper exit
[7] Stack movement of the paper exit
[8] Front side view
[9] Top side view
[10] Right side view

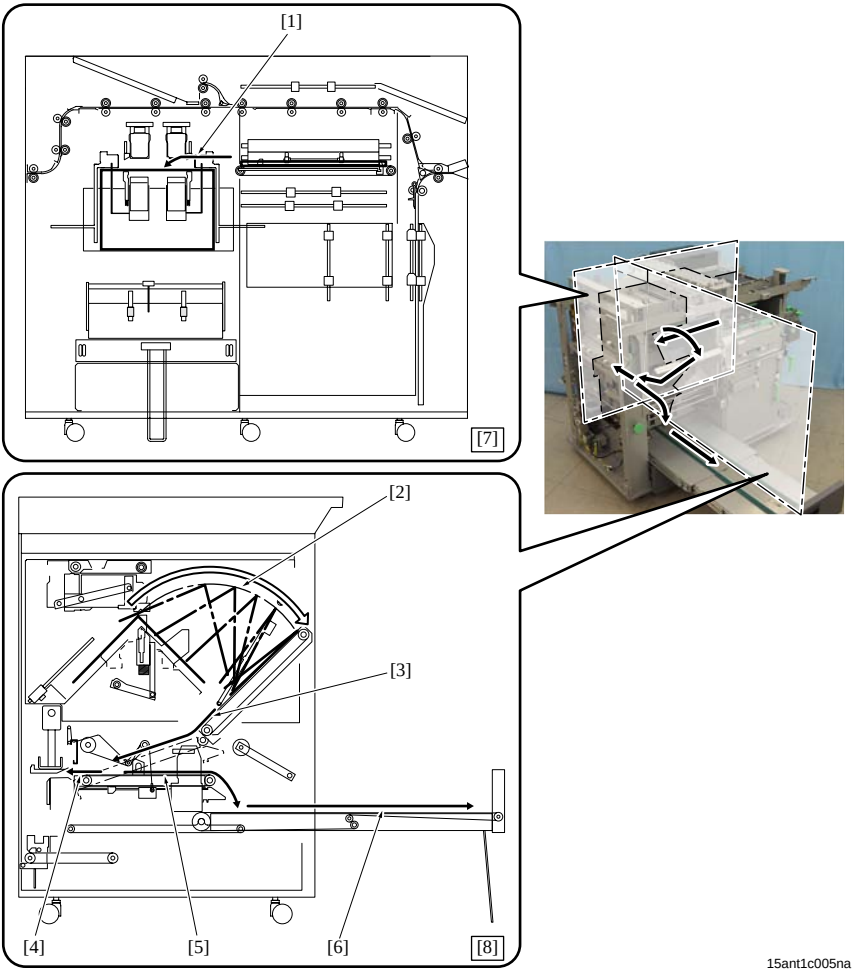
C. Multi center folding/saddle stitching mode

(1) From the paper exit from the main body to the center folding



[1] Stack to the right angle conveyance section
[2] Right angle conveyance
[3] Conveyance to the folding section
[4] Center folding (1st folding)
[5] Release from the folding roller
[6] Front side view
[7] Top side view
[8] Right side view

(2) From the center folding to the paper exit

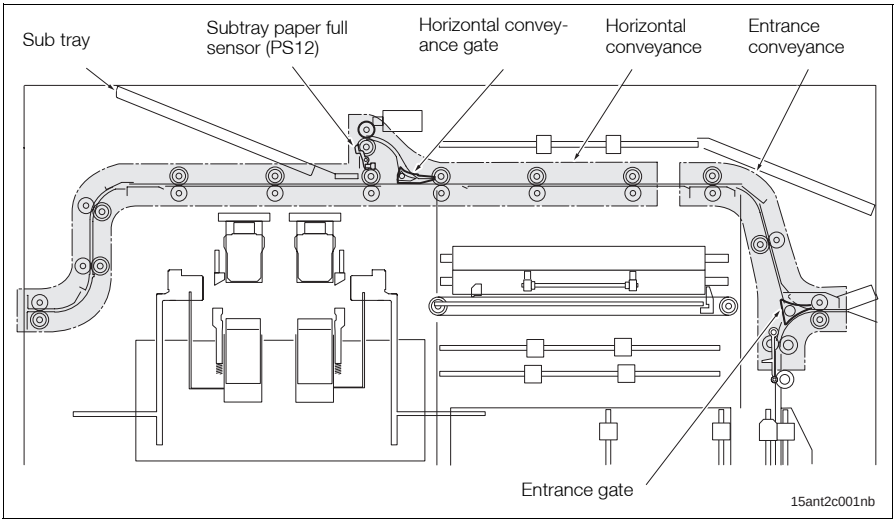


[1] Conveyance from the folding section to the saddle stitching section
[2] Movement by the bundle arm
[3] Movement by the clip
[4] Conveyance to the trimmer section (only for saddle stitching mode)
[5] Paper exit
[6] Stack movement of the paper exit
[7] Front side view
[8] Left side view

■ COMPOSITION/OPERATION

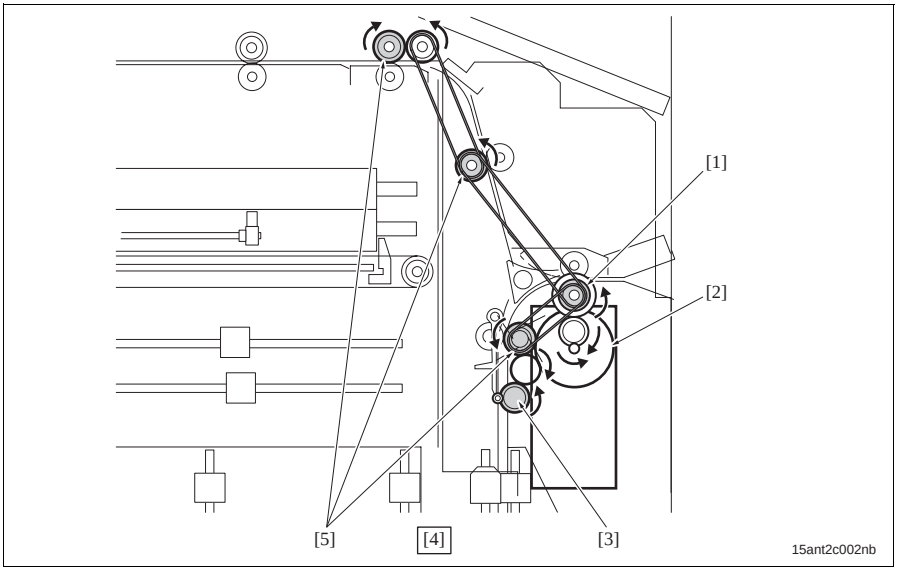
4. HORIZONTAL CONVEYANCE SECTION

⚠ 4.1 Composition



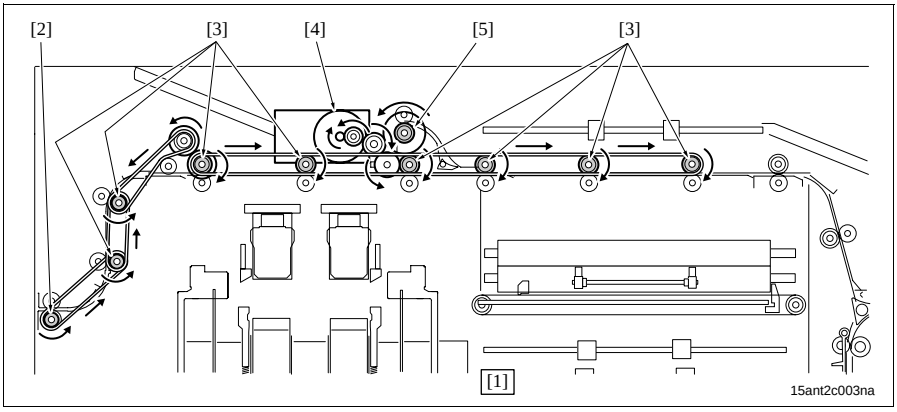
4.2 Drive

4.2.1 Entrance conveyance drive



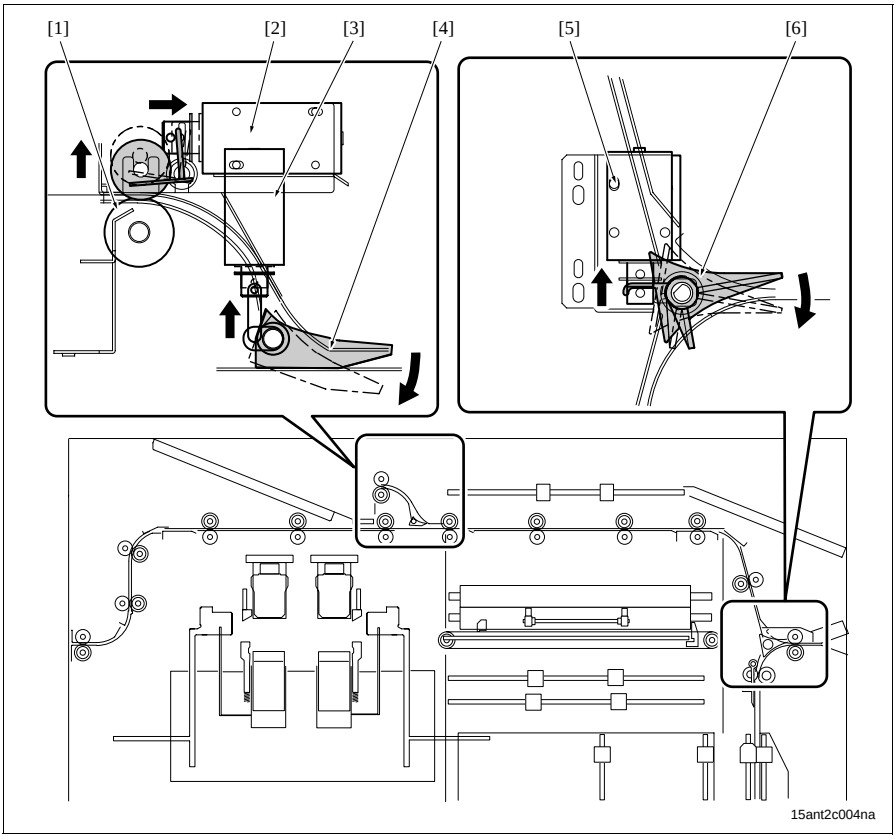
[1] Entrance roller
[2] Entrance conveyance motor (M1)
[3] Overlap assist roller
[4] Front side view
[5] Conveyance roller

4.2.2 Horizontal conveyance drive



[1] Front side view
[2] Exit roller
[3] Conveyance roller
[4] Horizontal conveyance motor (M2)
[5] Subtray exit roller

4.2.3 Gate drive/subtray pressure/release drive



[1] Subtray exit roller
[2] Roller release solenoid /4 (SD4)
[3] Horizontal conveyance gate solenoid (SD3)
[4] Horizontal conveyance gate
[5] Entrance gate solenoid (SD1)
[6] Entrance gate

4.3 Operation

4.3.1 Conveyance path switching operation

A. Entrance gate solenoid control

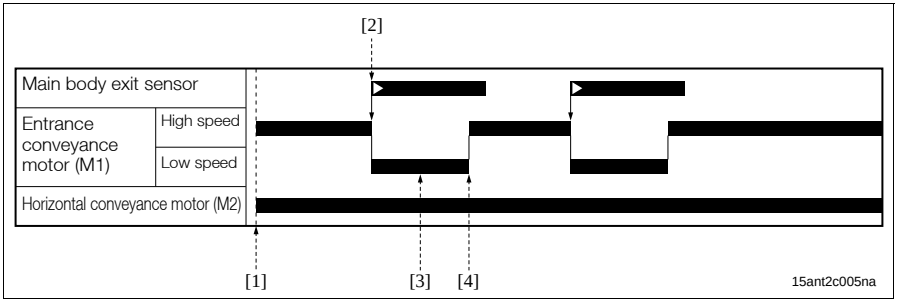
The entrance gate switches the path to the horizontal conveyance section and one to the right angle conveyance section. The switch is conducted by the entrance gate solenoid (SD1). The right angle conveyance path is selected when SD1 turns OFF and the horizontal conveyance path is selected when it turns ON.
In the coupling exit mode and the subtray exit mode, SD1 turns ON and sets the entrance gate to the horizontal conveyance section when the main body print signal turns ON. SD1 turns OFF after the paper exit.

B. Horizontal conveyance gate control

The horizontal conveyance gate switches the path to the subtray section and the coupling conveyance path to the succeeding device. The switch is conducted by the horizontal conveyance gate solenoid (SD3). The coupling conveyance path is selected when SD3 turns OFF and the subtray path is selected when it turns ON.

4.3.2 Conveyance line speed switch control

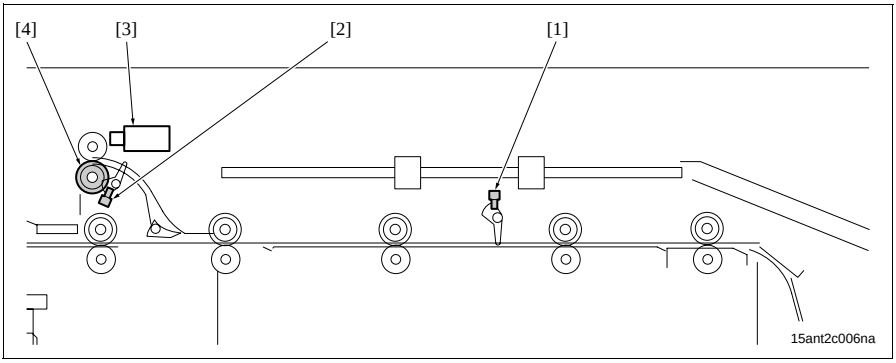
The conveyance is conducted by the entrance conveyance motor (M1) and the horizontal conveyance motor (M2).
M1 and M2 turn ON when the main body start signal [1] turns ON. M1 switches its rotational speed in accordance with the main body line speed [3] when the main body exit sensor turns ON [2]. Then it switches its rotational speed to high speed [4] to convey the paper when it receives the paper trailing edge signal (when the paper trailing edge passes through the fusing).



[1] Main body start signal
[2] Main body exit sensor ON
[3] M1 switching to a low speed
[4] Main body paper trailing edge signal

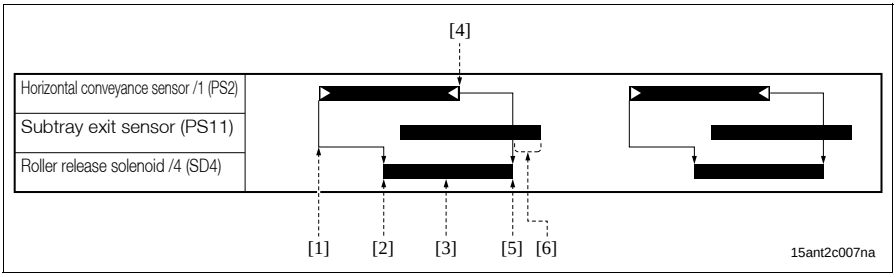
4.3.3 Subtray exit control

When exiting the paper to the subtray, the paper is prevented to be misaligned by releasing the nipping of the subtray exit roller by the roller release solenoid /4 (SD4) to nip the paper only at the trailing edge and slowing down the paper by the subtray exit roller that is rotating in low speed for every paper. The horizontal conveyance sensor /1 (PS2) [1] and the subtray exit sensor (PS11) [2] detect the paper exited to the subtray.



[1] Horizontal conveyance sensor /1 (PS2)
[2] Subtray exit sensor (PS11)
[3] Roller release solenoid (SD4)
[4] Subtray exit roller

The roller release solenoid /4 (SD4) turns ON [2] to release the nipping of the subtray exit roller [3] after a specified period of time since the horizontal conveyance sensor /1 (PS2) detects the leading edge of paper [1]. SD4 turns OFF [5] and the subtray exit roller nips at the trailing edge of paper [6] after a specified period of time since PS2 detects the trailing edge of paper [4]. This control is conducted for every paper exited to the subtray.



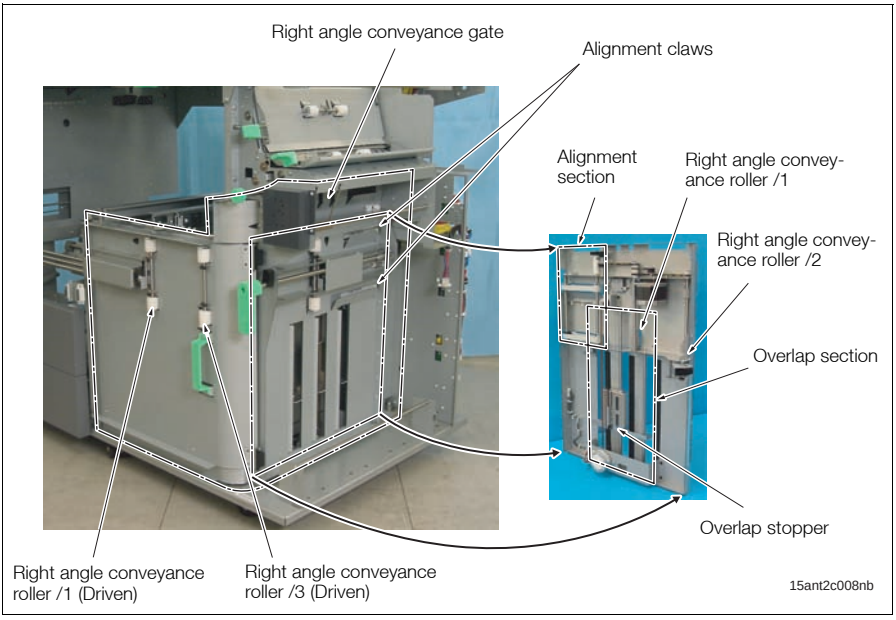
[1] Detection of the leading edge of paper
[2] SD4 ON
[3] Release of nip
[4] Detection of the trailing edge of paper
[5] SD4 OFF
[6] Nipping at the trailing edge of paper

4.3.4 Subtray paper full detection control

The subtray paper full detection is conducted by the subtray paper full sensor (PS12) via the actuator.
PS12 turns ON under normal circumstances. The subtray paper full condition is detected and the subtray paper full signal is transmitted to the main body when the actuator is pressed by stacked paper and PS12 turns OFF. Then, the main body displays the message on its operation panel.

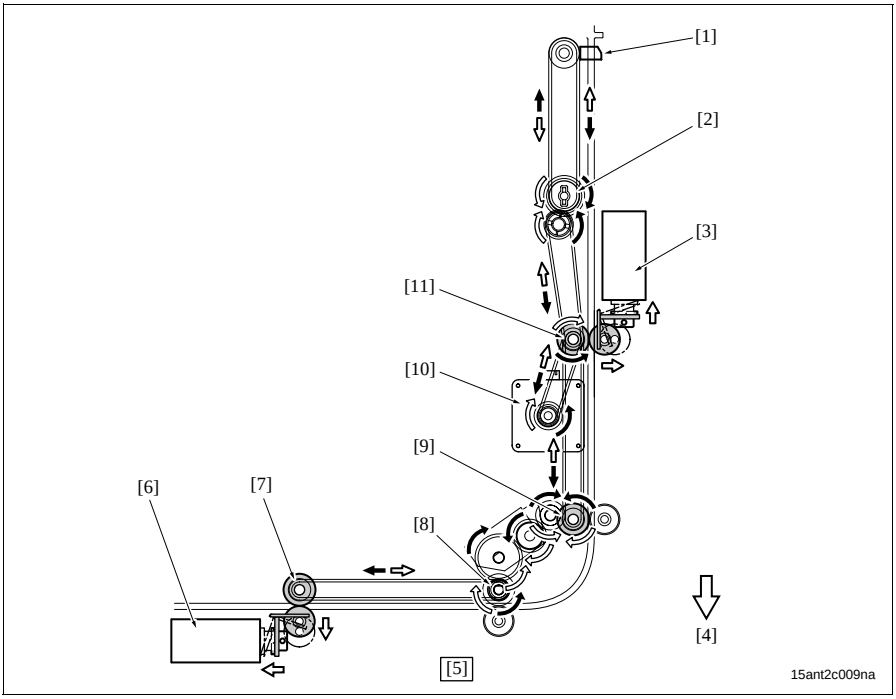
5. RIGHT ANGLE CONVEYANCE SECTION

⚠ 5.1 Composition



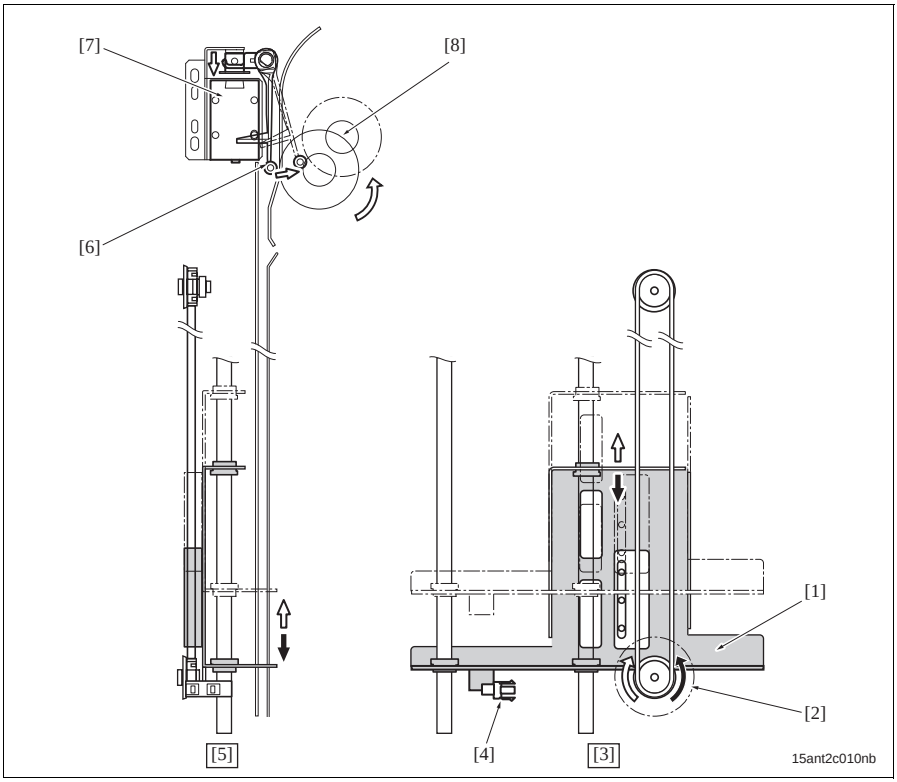
5.2 Drive

5.2.1 Right angle conveyance drive/alignment drive



[1] Alignment claws
[2] Torque limiter
[3] Roller release solenoid /1 (SD5)
[4] Front side direction
[5] Top side view
[6] Roller release solenoid /2 (SD6)
[7] Right angle conveyance roller /4
[8] Right angle conveyance roller /3
[9] Right angle conveyance roller /2
[10] Right angle conveyance motor (M6)
[11] Right angle conveyance roller /1

5.2.2 Overlap drive



[1] Overlap stopper
[2] Overlap motor (M13)
[3] Right side view
[4] Overlap home sensor (PS17)
[5] Front side view
[6] Right angle conveyance gate
[7] Right angle conveyance gate solenoid (SD2)
[8] Overlap assist roller

5.3 Operation

5.3.1 Paper overlap control

A. Overlap mechanism

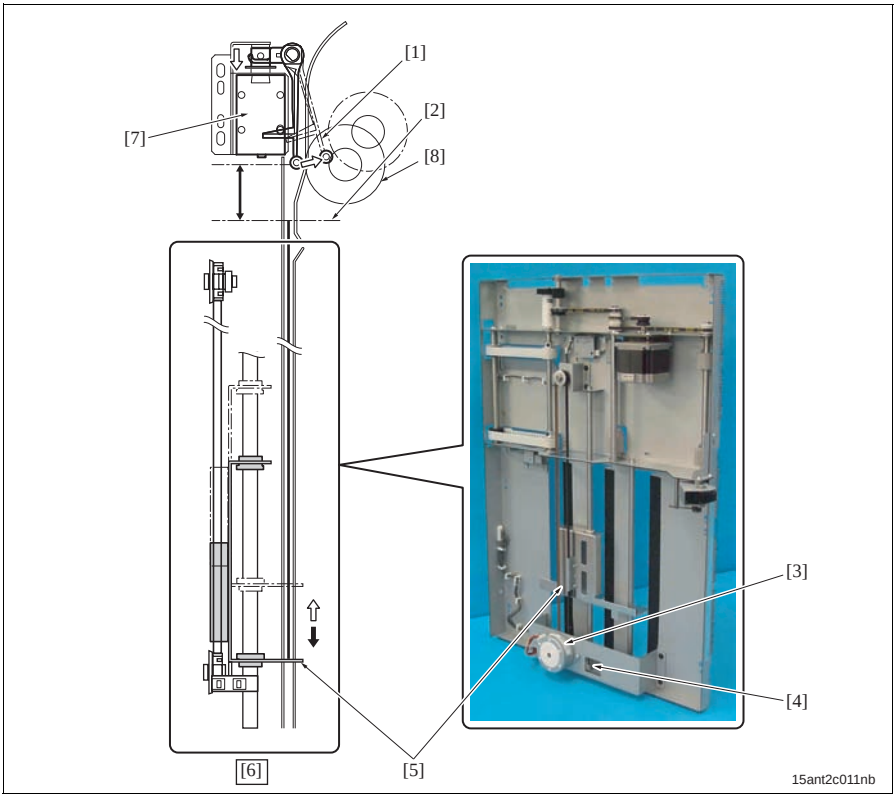
When the folding operation is conducted for more than one sheet of paper, they are overlapped in the right angle conveyance section, and then conveyed to the folding section.

The overlap mechanism is the mechanism to overlap the paper in adequate paper conveyance order. The operation is conducted by the right angle conveyance gate [1] driven by the right angle conveyance gate solenoid (SD2) [7] and the overlap stopper [5] driven by the overlap motor (M13) [3]. The overlap home sensor (PS17) [4] detects the home position of the overlap stopper.

The overlap stopper [5] is positioned at the position where the trailing edge of paper [2] is positioned 20 mm below from the right angle conveyance gate [1] in accordance with the paper size when it stands by for the paper.

⚠1 When the SD2 is turned off, the paper from the main body is conveyed into between the right-angle conveyance gate [1] and the overlap assist roller [8]. Then the paper is conveyed further by the overlap assist roller [8] driven by the entrance conveyance motor (M1) and stopped by the overlap stopper.

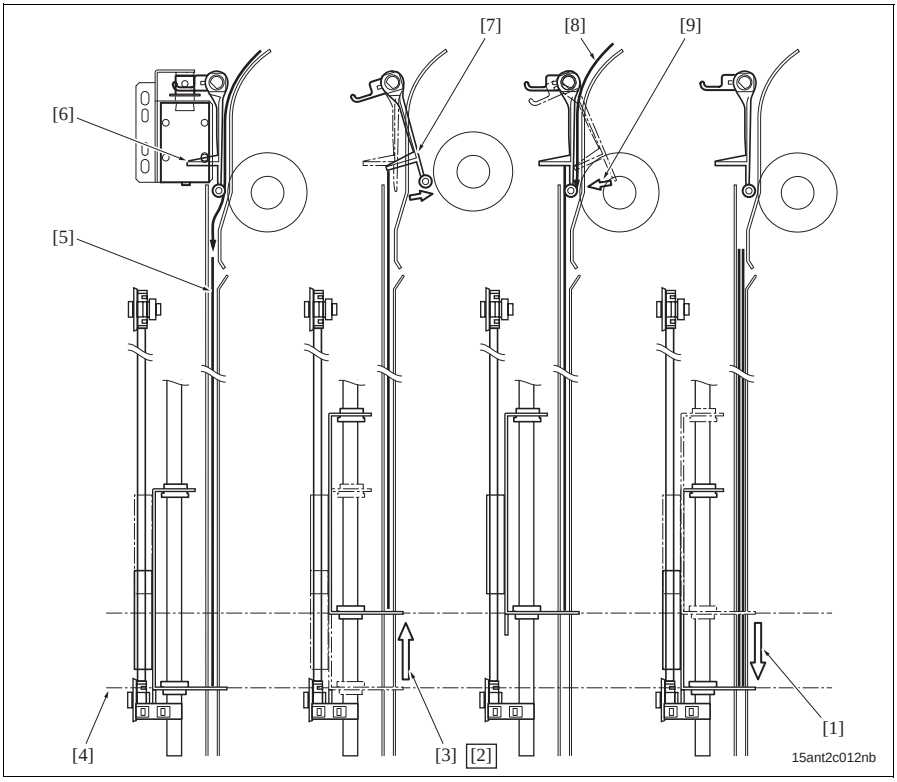
⚠1



[1] Right angle conveyance gate
[2] Trailing edge of paper
[3] Overlap motor (M13)
[4] Overlap home sensor (PS17)
[5] Overlap stopper
[6] Front side view
[7] Right angle conveyance gate solenoid (SD2)
⚠1 [8] Overlap assist roller

The first stacked sheet of paper [5] is conveyed while the overlap stopper is located at the standby position [4]. Before conveying the second paper, right angle conveyance gate solenoid (SD2) turns ON to move the right angle conveyance gate [6] to the right [7]. At the time, overlap motor (M13) moves the overlap stopper 30 mm upward [3]. It transfers the stacked paper to the left side of the right angle conveyance gate. The right angle conveyance gate is replaced [9] to clear the conveyance path. The subsequent paper [8] passes the right side of the right angle conveyance gate and the paper is overlapped in adequate order. Then, M13 moves the overlap stopper downward [1].

The same as the second sheet is conducted until all of sheets are stacked.



[1] Overlap stopper moving 30 mm downward
[2] Front side view
[3] Overlap stopper moving 30 mm upward
[4] Standby position of the overlap stopper
[5] 1st paper
[6] Right angle conveyance gate
[7] Right angle conveyance gate moved
[8] 2nd paper
[9] Right angle conveyance gate replaced

B. Overlap control

(1) Multi letter folding mode control

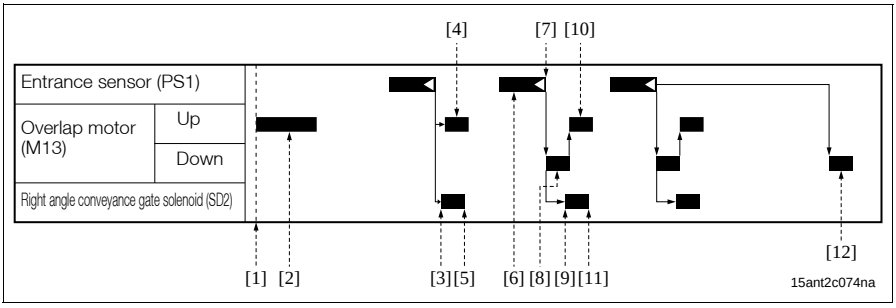
In the multi letter folding mode, up to 5 sheets are stacked in the right angle conveyance section and conveyed to the folding section. The multi letter folding is available only with paper of 50 to 91 g/m^2 in weight and is unavailable with others.

The overlap motor (M13) turns ON when the main body start signal [1] turns ON and moves the overlap stopper upward to its standby position.

Turning ON the right angle conveyance gate solenoid (SD2) [3] after a specified period of time since the entrance sensor (PS1) detects the trailing edge of the paper, the right angle conveyance gate is switched, M13 moves the paper upward [4], and isolate the paper from the conveyance gate by transferring it to the left side of the right angle conveyance gate. Turning OFF SD2 [5], the conveyance gate opens and waits for the subsequent paper.

Conveying the subsequent paper through the right side of the right angle conveyance gate [6] and detecting the trailing edge of paper by the entrance sensor (PS1) [7], M13 moves the overlap stopper downward [8]. When the trailing edge of paper passes under the right angle conveyance gate, SD2 turns ON [9] to switch the right angle conveyance gate and M13 moves up the overlap stopper [10] to send the conveyed sheets of paper to the left side of the right angle conveyance gate. Then, SD2 turns OFF [11] and stands by for the subsequent paper.

The overlap stopper moves down to the standby position and stands by for the 1st paper of the subsequent set [12] after a specified period of time since PS1 detects the trailing edge of last paper of the set.



[1] Main body start signal

[2] Overlay stopper moved to its standby position

[3] Right conveyance gate switched

[4] Paper isolated

[5] Conveyance path cleared

[6] Subsequent paper conveyed

[7] Trailing edge of the subsequent paper detected

[8] Paper moved downward

[9] Right conveyance gate switched

[10] Paper isolated

[11] Conveyance path cleared

[12] Overlay stopper moved to its standby position

(2) Center folding/saddle stitching mode control

In the center folding and saddle stitching modes, 1, 2, or 3 sheets of paper are stacked and conveyed to the folding section. The number of the stacked sheets is different depending on its paper weight and the conveyance pattern.

Normal paper (less than 130 g/m^2): up to 3 sheets are stacked and conveyed to the folding section.

Thick paper (more than 131 g/m^2): due to the limit of the folding performance, up to 2 sheets are stacked and conveyed to the folding section.

- Normal paper

For the 1st set, 2 sheets of paper are stacked and conveyed to the folding section at first. Similarly, 2 sheets of paper are stacked and conveyed to the folding section for the subsequent sheets. At the final conveyance, 2 sheets are conveyed (if the total number of the paper is even) or 1 sheet is conveyed (if the number is odd). It does not convey 3 sheets at a time for the odd case because the timing to transmit the information such as the page count, the paper type, and so on is too late when the printing is conducted from a PC.

For the 2nd and following set, 3 sheets of paper are stacked and conveyed to the folding section at first to take adequate time to conduct the folding operation for the preceding set. At the final conveyance, 2 sheets are conveyed (if the total number of the paper is even) or 3 sheets are conveyed (if the number is odd).

- Thick paper

Up to 2 sheets of paper can be stacked for the thick paper.

For every set, 2 sheets of paper are stacked and conveyed to the folding section at first. Similarly, 2 sheets of paper are stacked and conveyed to the folding section for the subsequent sheets. At the final conveyance, 2 sheets are conveyed (if the total number of the paper is even) or 1 sheet is conveyed (if the number is odd).

- Using PI function

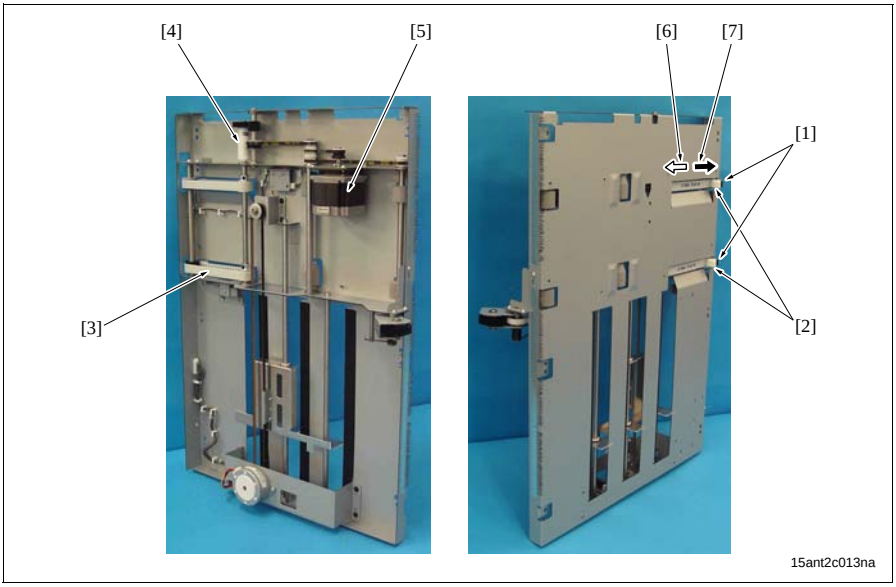
The same as the thick paper control is conducted because the paper type information cannot be obtained in the print job using PI.

5.3.2 Alignment control

A. Alignment mechanism

The alignment is conducted by driving the alignment claws [2] by the right angle conveyance motor (M6) [5] through the belt [3] and the torque limiter [4].

The alignment claws move to the rear of the shelter direction [7] and are stopped by the mechanical stoppers [1] through the torque limiter when M6 is rotating toward the paper conveyance direction. Rotating M6 in the reverse direction, the alignment claws push the edge of paper to conduct the alignment [6].



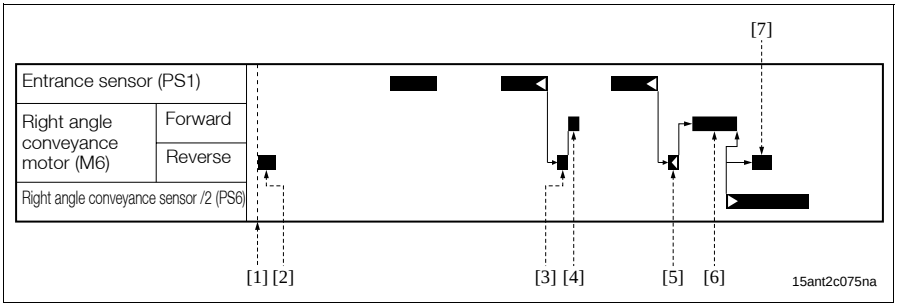
[1] Mechanical stoppers
[2] Alignment claws
[3] Belt
[4] Torque limiter
[5] Right angle conveyance motor (M6)
[6] Aligning direction
[7] Shelter direction

B. Alignment control

The right angle conveyance motor (M6) rotates in the reverse direction when the main body start signal [1] turns ON and the alignment claws move to the standby position [2] in accordance with the paper size.

No alignment operation is conducted for the 1st paper. M6 rotates in the reverse direction to align paper with the alignment claws [3] after a specified period of time since the entrance sensor (PS1) detects the trailing edge of 2nd paper. Then, M6 rotates in the forward direction to replace the alignment claws to the standby position [4].

M6 rotates to convey the paper to the folding section [6] and evacuate the alignment claws to the home position after a specified period of time after the alignment operation [5] for the last paper of the set. After a specified period of time after the right angle conveyance sensor /2 (PS6) detects the leading edge of paper, M6 rotates in the reverse direction to move the alignment claws to the standby position [7] for the subsequent copy.



[1] Main body start signal

[2] Alignment claws moved to the standby position

[3] Alignment operation

[4] Alignment claws moved back to the standby position

[5] Alignment operation

[6] Paper conveyed to the folding section

[7] Alignment claws moved back to the standby position

5.3.3 Right angle conveyance control

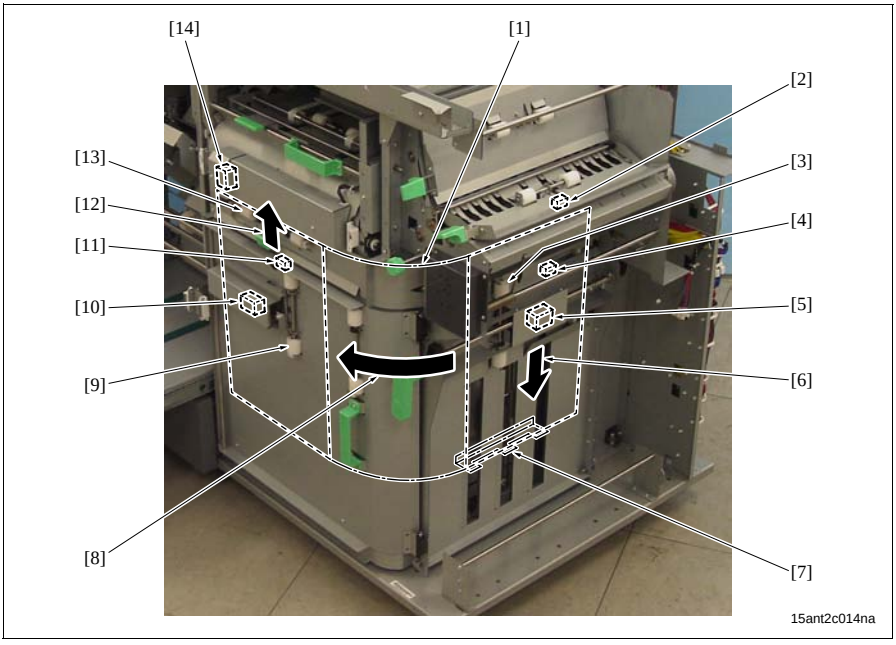
A. Right angle conveyance mechanism

In the right angle conveyance, the right angle conveyance motor (M6) and the roller release solenoids /1 (SD5) [5] and /2 (SD6) [10] convey the paper.

⚠1 When conveying the paper to the overlap section, the paper falls vertically [6] to the overlap stopper [7] by its own weight after conveyed by the overlap assist roller. At the time, the press by the right angle conveyance roller /1 [3] is released by default since the conveyance direction is not the rotational direction of the right angle conveyance roller /1 [3] but the axial direction of the right angle conveyance roller /1.

After stacking and aligning the specified number of papers, the roller release solenoid /1 (SD5) [5] turns ON to nip the paper and convey the paper to the position rotated 90° from the right side to the front side [8]. The roller release solenoid /3 (SD7) [14] is OFF to release the pressure of the folding entrance roller by default since the upper edge of the paper [1] passes over the folding entrance roller [13].

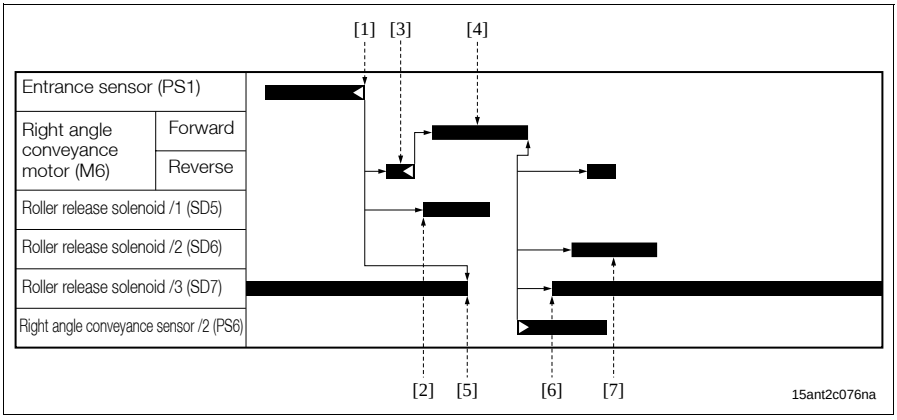
When conveying the paper from the right angle conveyance section to the folding section [12], the roller release solenoid /2 (SD6) [10] turns ON to release the pressure of the right angle conveyance roller /4 [9] and convey the paper to the folding section by nipping the paper with the folding entrance roller [13].



[1] Upper edge of the paper path
[2] Entrance sensor (PS1)
[3] Right angle conveyance roller /1
[4] Right angle conveyance sensor /1 (PS5)
[5] Roller release solenoid /1 (SD5)
[6] Paper conveyed to the overlap section
[7] Overlap stopper
[8] Right angle conveyance
[9] Right angle conveyance roller /4
[10] Roller release solenoid /2 (SD6)
[11] Right angle conveyance sensor /2 (PS6)
[12] Paper conveyed to the folding section
[13] Folding entrance roller
[14] Roller release solenoid /3 (SD7)

B. Conveyance control

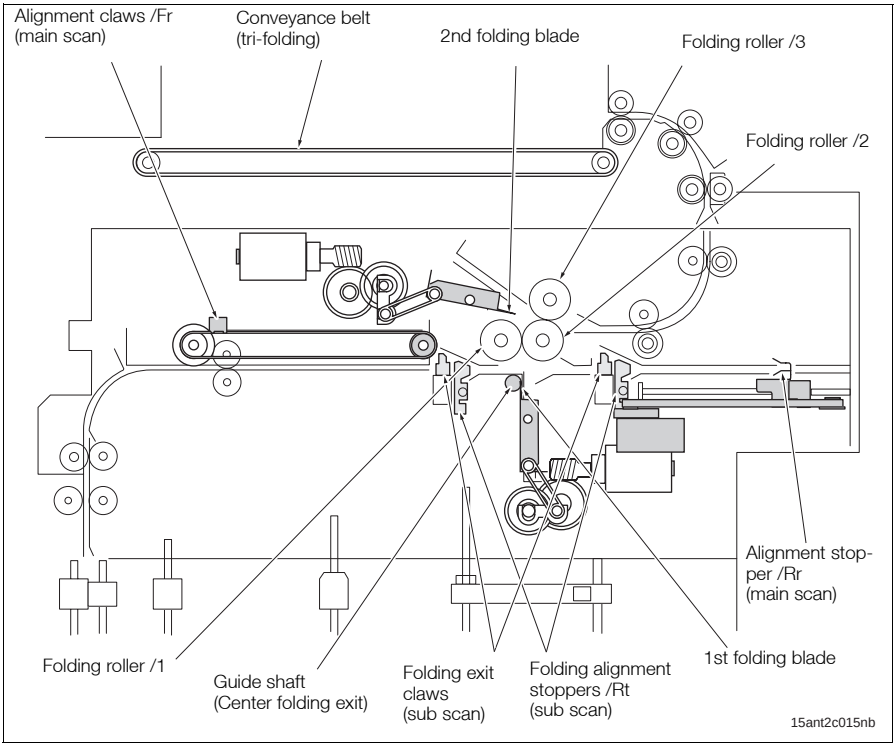
The roller release solenoid /1 (SD5) turns ON to press the right angle conveyance roller /1 [2] after a specified period of time since the entrance sensor (PS1) detects the trailing edge of last paper of the set [1]. After the alignment operation [3], the right angle conveyance motor (M6) rotates in the forward direction to convey the paper to the front side [4] by rotating 90°. At this time, the roller release solenoid (SD7) turns OFF a specified period of time after the entrance sensor (PS1) detects the trailing edge of paper and releases the pressure of the folding entrance roller /1 [5]. A specified period of time after the right angle conveyance sensor /2 (PS6) detects the leading edge of paper, SD7 turns ON to pressure the folding entrance roller /1 and nip [6] the upper section of paper that has been conveyed to the front side. And also, a specified period of time after that, when the roller release solenoid /2 (SD6) turns ON to release the right angle conveyance roller /4 [7] and convey the paper to the folding section.



[1] Trailing edge of the last paper of the set detected
[2] Right angle conveyance roller /1 pressure
[3] Paper alignment
[4] Paper conveyance
[5] Folding entrance roller pressure release
[6] Folding entrance roller pressure
[7] Right angle conveyance roller /4 pressure release

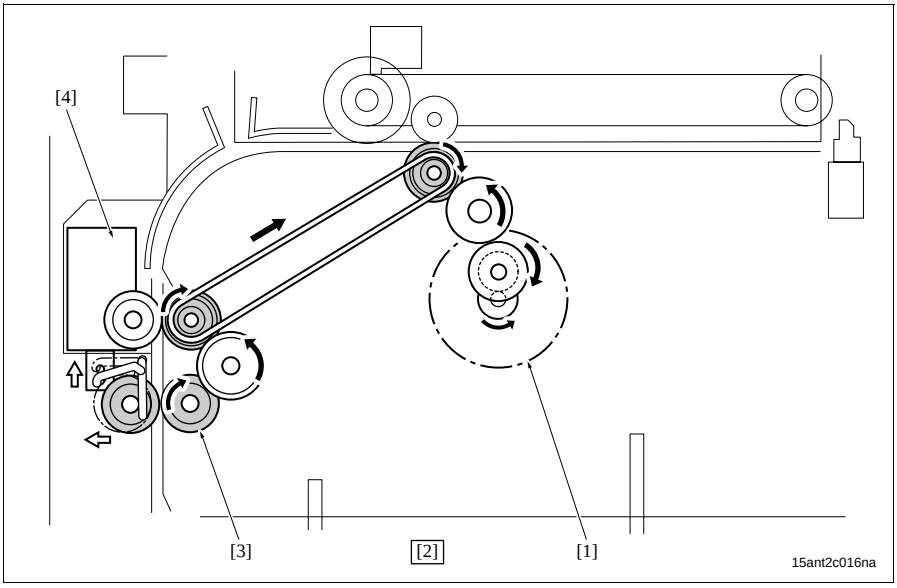
6. FOLDING SECTION

⚠ 6.1 Composition



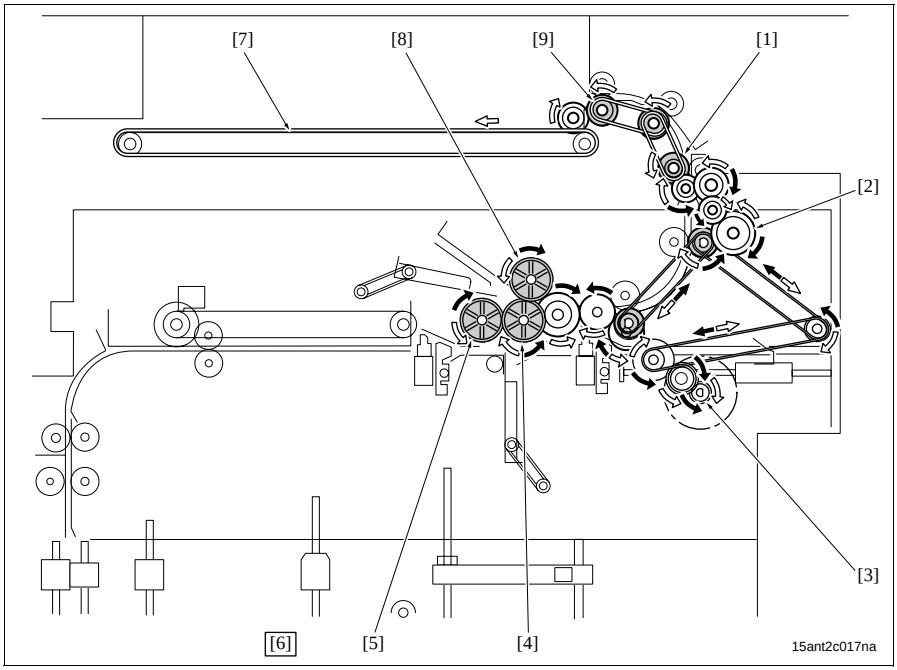
6.2 Drive

6.2.1 Folding entrance drive



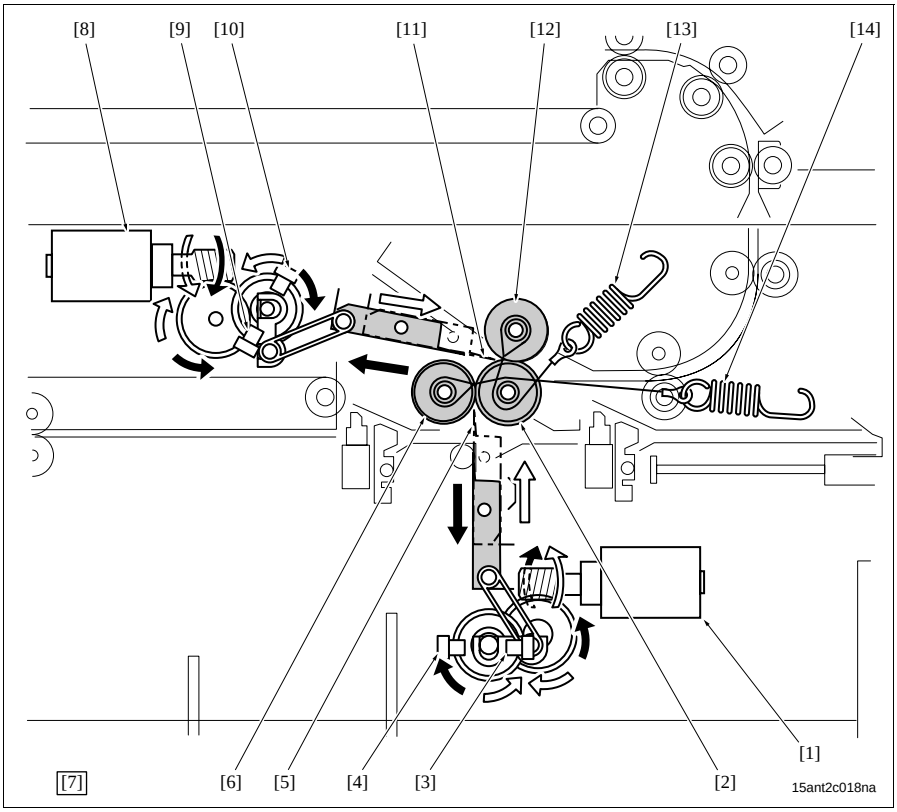
[1] Folding entrance motor (M3)
[2] Right side view
[3] Folding entrance roller /1
[4] Roller release solenoid /3 (SD7)

6.2.2 Folding conveyance drive



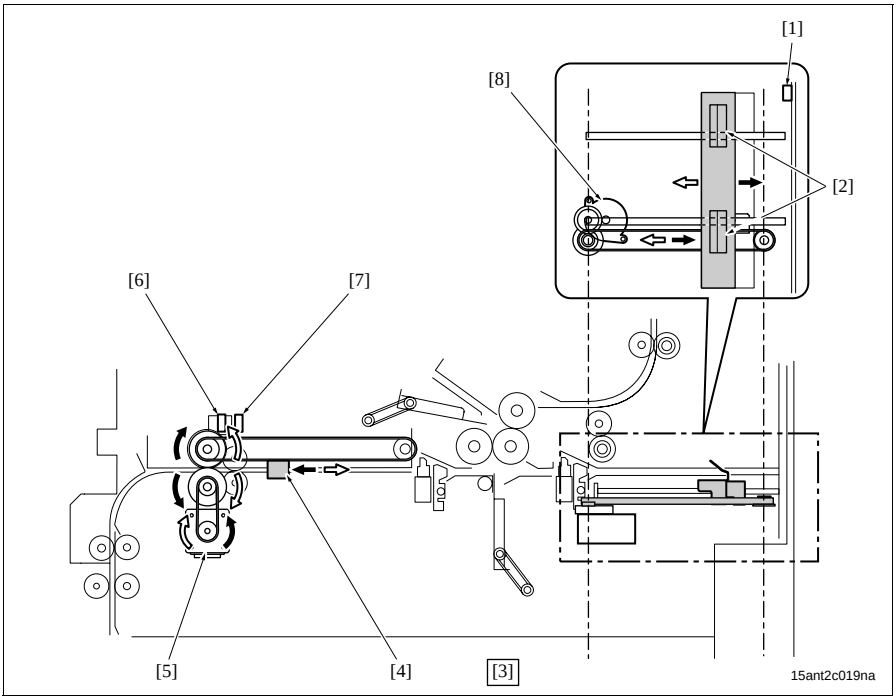
[1] One way clutch
[2] Oscillation connecting gear
[3] Folding conveyance motor (M4)
[4] Folding roller /2
[5] Folding roller /1
[6] Right side view
[7] Exit belt
[8] Folding roller /3
[9] Tri-folding exit clutch (CL1)

6.2.3 Folding blade drive



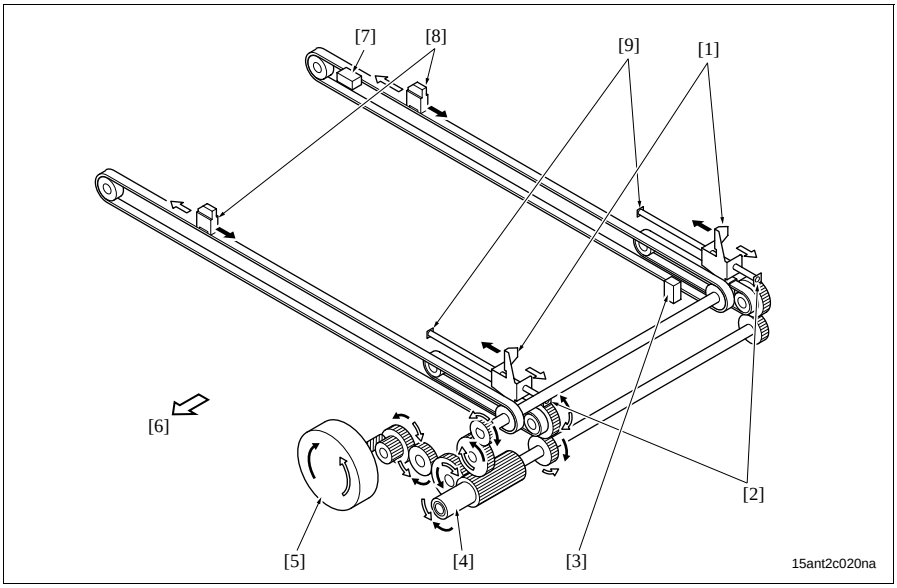
[1] 1st folding blade motor (M18)
[2] Folding roller /2
[3] 1st folding blade home sensor /2 (PS21)
[4] 1st folding blade home sensor /1 (PS20)
[5] 1st folding blade
[6] Folding roller /1
[7] Right side view
[8] 2nd folding blade motor (M19)
[9] 2nd folding blade home sensor /2 (PS23)
[10] 2nd folding blade home sensor /1 (PS22)
[11] 2nd folding blade
[12] Folding roller /3
[13] Spring (pressing the folding rollers /2 and /3)
[14] Spring (pressing the folding rollers /1 and /2)

6.2.4 Folding main scan alignment drive



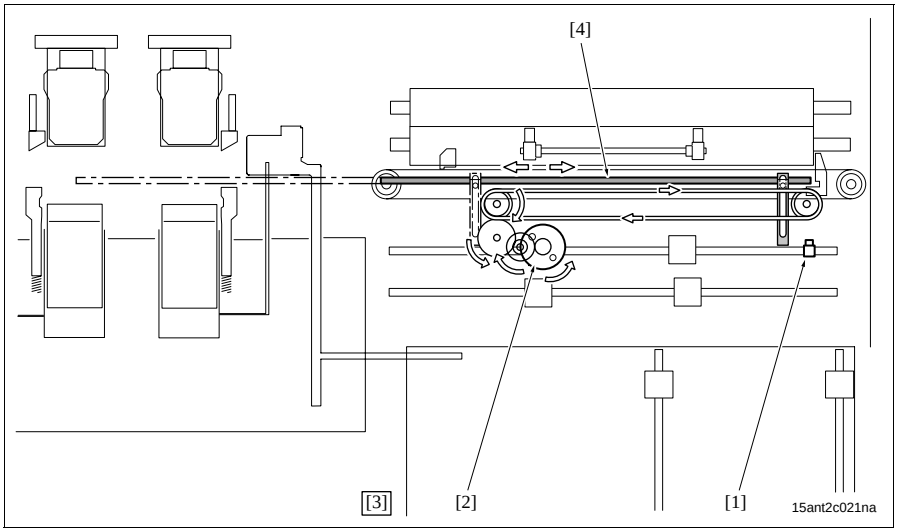
[1] Folding main scan alignment home sensor /Rr (PS19)
[2] Alignment stoppers /Rr
[3] Right side view
[4] Alignment claws /Fr
[5] Folding main scan alignment motor /Fr (M7)
[6] Folding main scan alignment home sensor /Fr1 (PS18)
[7] Folding main scan alignment home sensor /Fr2 (PS49)
[8] Folding main scan alignment motor /Rr (M14)

6.2.5 Folding sub scan alignment/center folding exit drive



[1] Folding alignment stoppers /Rt
[2] Home position stoppers /Rt
[3] Folding exit home sensor (PS24)
[4] Torque limiter
[5] Folding sub scan alignment motor (M8)
[6] Front side direction
[7] Folding sub scan alignment home sensor (PS56)
[8] Folding exit claws
[9] Alignment stoppers /Lt

6.2.6 Guide shaft drive



[1] Guide shaft home sensor (PS46)
[2] Guide shaft motor (M25)
[3] Front side view
[4] Guide shaft

6.3 Operation

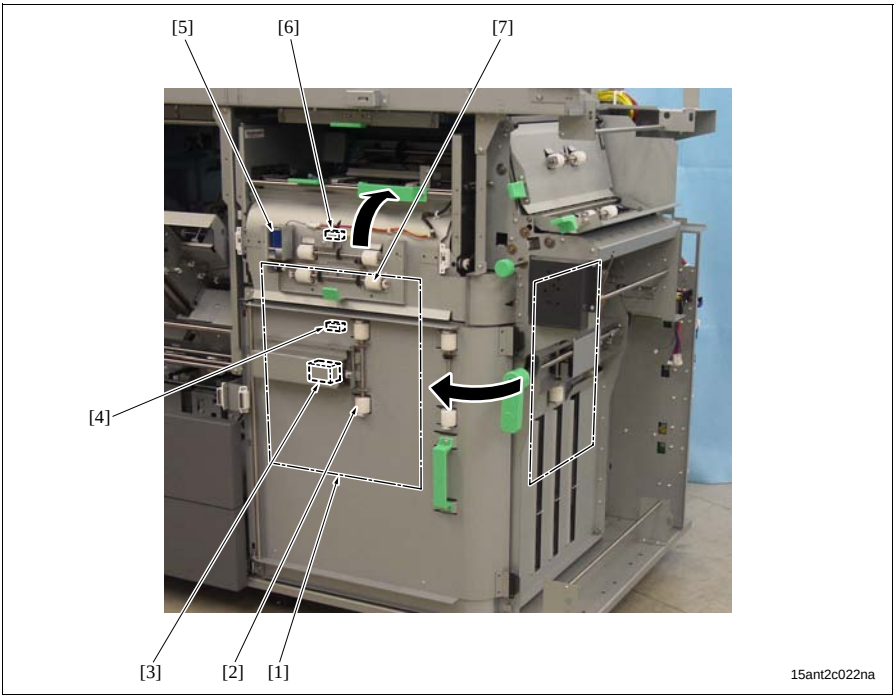
6.3.1 Folding entrance conveyance control

A. Mechanism

The folding entrance motor (M3) and the roller release solenoid /3 (SD7) [5] conduct the folding entrance conveyance operation.

The paper [1] conveyed from the right angle conveyance section is conveyed to the folding entrance with the pressure of the folding entrance roller /1 [7] released. Once the right angle conveyance is completed, SD7 [5] turns ON to pressure the nipping of the folding entrance roller /1 and the roller release solenoid /2 (SD6) [3] turns ON to release the right angle conveyance roller /4, M3 convey the paper to the folding section.

The folding entrance sensor (PS60) [6] detects the paper at the folding entrance.



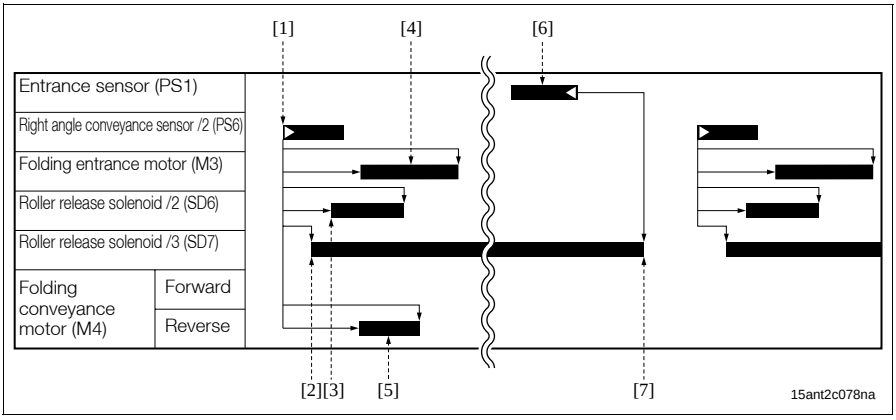
[1] Paper
[2] Right angle conveyance roller /4
[3] Roller release solenoid /2 (SD6)
[4] Right angle conveyance sensor /2 (PS6)
[5] Roller release solenoid /3 (SD7)
[6] Folding entrance sensor (PS60)
[7] Folding entrance roller /1

B. Control

The roller release solenoid /3 (SD7) turns ON to nip the paper with the folding entrance roller [2] after a specified period of time since the right angle conveyance sensor /2 (PS6) detects the leading edge of paper [1], and then the roller release solenoid /2 (SD6) turns ON to release the nip of the right angle conveyance roller /4 [3] after a specified period of time. Then the folding entrance motor (M3) turns ON and conveys the paper to the folding section [4].

At the time, the folding conveyance motor (M4) rotates in the reverse direction [5] to prevent the paper from being caught between the folding rollers /1 and /2.

SD7 turns OFF to release the pressure of the folding entrance roller [7] after a specified period of time since the entrance sensor (PS1) detects the trailing edge of last paper of the subsequent set [6] and it stands by for the paper of the subsequent set being conveyed to the front side of the right angle conveyance section.



[1] Last paper of the 1st set

[2] Folding entrance roller nipped

[3] Nip of the right angle conveyance roller /4 released

[4] Folding entrance conveyance

[5] Caught-protection to the folding section

[6] Last paper of the subsequent set

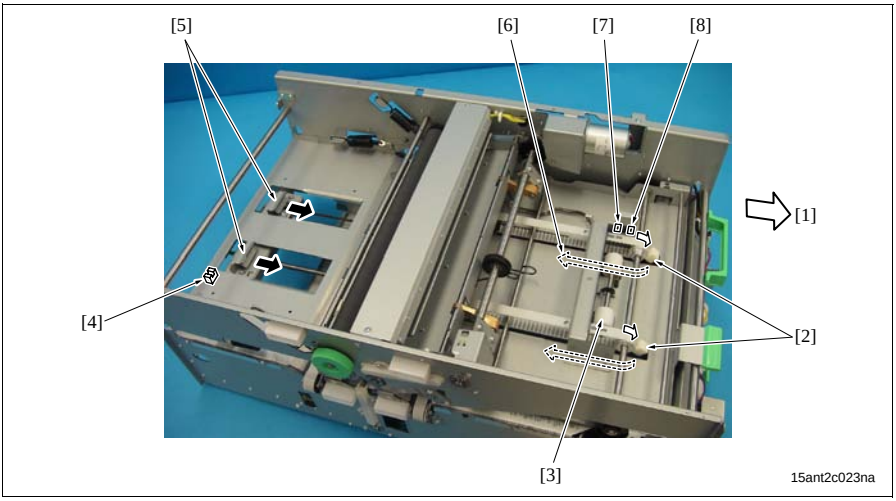
[7] Nip of the folding entrance roller released

6.3.2 Folding main scan alignment control

A. Mechanism

In the folding main scan alignment, the alignment stoppers /Rr [5] driven by the folding main scan alignment motor /Rr (M14) stop at the appropriate position in accordance with the paper size, and then the alignment claws /Fr [2] driven by the folding main scan alignment motor /Fr (M7) conduct the alignment operation. The home position of the alignment claws /Fr is detected by the folding main scan alignment home sensors /Fr1 (PS18) [8] and /Fr2 (PS49) [7] and the home position of the alignment tab /Rr is detected by the folding main scan alignment home sensor /Rr (PS19) [4].

The alignment claws /Fr [2] convey [6] the paper by pushing its trailing edge once the paper passes the folding entrance roller /3 [3] and until the leading edge of paper contacts with the alignment stopper /Rr [5] because there is no conveyance roller between the folding entrance conveyance roller /3 and the alignment stopper /Rr.



[1] Front side direction
[2] Alignment claws /Fr
[3] Folding entrance roller /3
[4] Folding main scan alignment home sensor /Rr (PS19)
[5] Alignment stoppers /Rr
[6] Paper conveyance
[7] Folding main scan alignment home sensor /Fr2 (PS49)
[8] Folding main scan alignment home sensor /Fr1 (PS18)

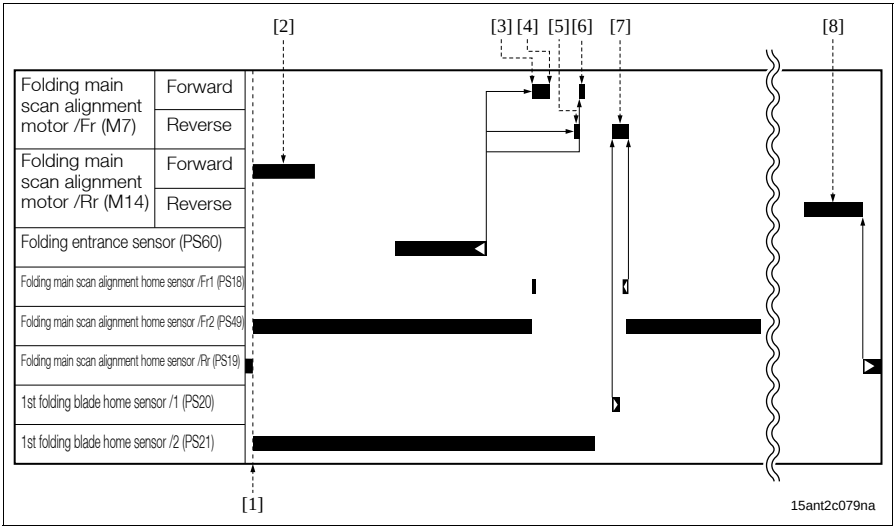
B. Control

The folding main scan alignment motor /Rr (M14) drives the alignment stoppers /Rr to the appropriate position in accordance with the paper size [2] when the main body start signal [1] turns ON.

The folding main scan alignment motor /Fr (M7) rotates in the forward direction to let [3] the alignment claws /Fr push the trailing edge of paper for conveyance after a specified period of time since the folding entrance sensor (PS60) detects the trailing edge of paper, and then M7 stops after a specified period of time [4]. The alignment stoppers /Rr push the leading edge of paper to conduct the alignment. M7 rotates in the reverse direction [5], and after a specified period of time it rotates in the forward direction to conduct the alignment again [6].

M7 rotates in the reverse direction to replace the alignment claws to the home position [7] when the 1st folding blade home sensor /1 (PS20) detects the completion of the folding operation. M7 starts rotating to replace the alignment claws to the home position for subsequent set when PS21 detects the completion of the folding operation since the 1st folding blade conducts the reciprocal operation in which the 1st folding blade home sensor /1 (PS20) and the 1st folding blade home sensor /2 (PS21) counter changes their positions at each folding operation. M7 stops rotating when the folding main scan alignment home sensor /Fr1 (PS18) detects the home position of the alignment claws.

Transmitting the print termination signal from SD, M14 rotates to move the alignment stoppers to the home position [8]. It stops rotating when the folding main scan alignment home sensor /Rr (PS19) detects the home position of the alignment stoppers.



[1] Main body start signal
[2] Alignment stopper /Rr moved for appropriate paper size
[3] Paper conveyed by the alignment claws /Fr
[4] Alignment operation
[5] Alignment claws /Fr shelter operation
[6] Alignment operation
[7] Alignment claws /Fr moved to the home position
[8] Alignment stoppers /Rr moved to the home position

6.3.3 Folding control

A. Mechanism

Folding consists of the 1st folding and 2nd folding.

The 1st folding is conducted in the multi letter folding mode, the multi center folding mode, and the saddle stitching mode. The 2nd folding is conducted only in the multi letter folding mode.

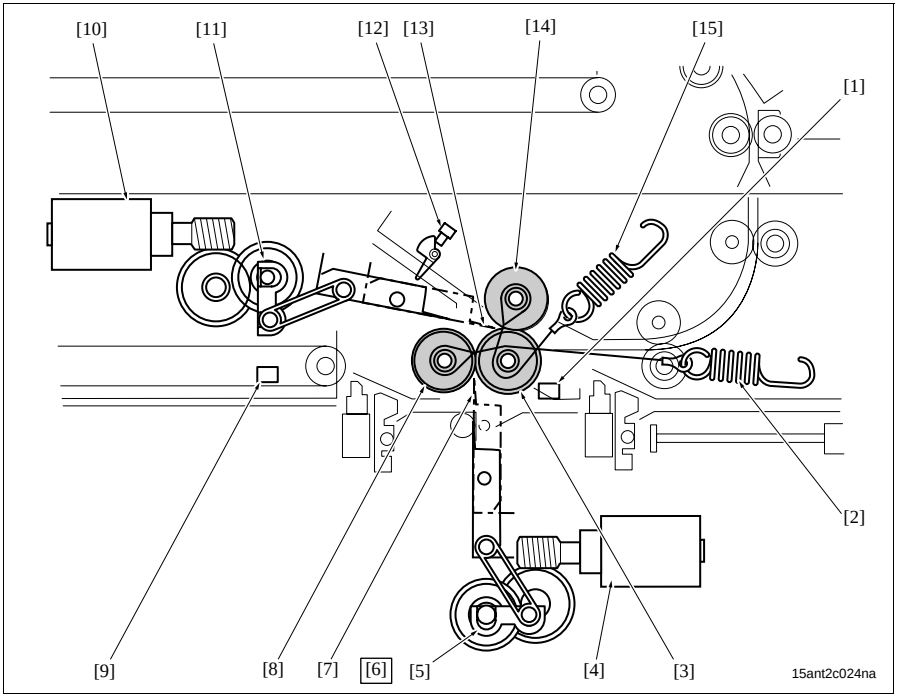
In the 1st folding operation, the 1st folding blade [7] pushes and inserts the paper between the folding rollers /1 [8] and /2 [3].

The folding rollers /1 and /2 are pressured each other by the spring [2]. The 1st folding blade is driven by the 1st blade motor (M18) [4] via the crank mechanism [5].

In the 2nd folding operation, the 2nd folding blade [13] pushes and inserts the paper between the folding rollers /2 [3] and /3 [14].

The folding rollers /2 and /3 are pressured each other by the spring [15]. The 2nd folding blade is driven by the 2nd blade motor (M19) [10] via the crank mechanism [11].

The folding sensor /2 (PS44) [9], the folding sensor /1 (PS7) [1], and the folding passage sensor (PS8) [12] detect the paper.



[1] Folding sensor /1 (PS7)
[2] Spring
[3] Folding roller /2
[4] 1st folding blade motor (M18)
[5] Crank mechanism
[6] Right side view
[7] 1st folding blade
[8] Folding roller /1
[9] Folding sensor /2 (PS44)
[10] 2nd folding blade motor (M19)
[11] Crank mechanism
[12] Folding passage sensor (PS8)
[13] 2nd folding blade
[14] Folding roller /3
[15] Spring

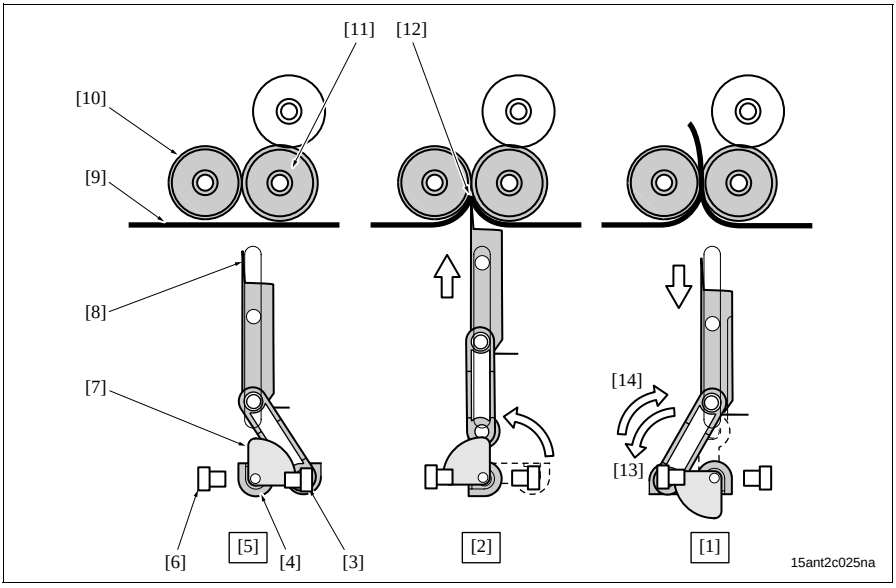
B. Tri-folding control

(1) Operation

After the initial operation, the 1st folding blade [8] is at the standby position /1 [5]. In the actuator [7], the 1st folding blade home sensor /2 (PS21) [3] turns ON and the 1st folding blade home sensor /1 (PS20) [6] turns OFF. When the paper [9] is conveyed to the folding section and the 1st folding blade motor (M18) is rotated [2], the crank [4] rotates 90° to project the 1st folding blade to the paper and push the paper [12] between the folding roller /1 [10] and /2 [11] with its edge. At the time, the actuator also rotates 90° so that PS21 [3] and PS20 [6] turns OFF and ON respectively.

M18 keeps rotating in the same direction [13], and then the crank [4] stops when it reaches at the standby position /2 [1] (PS20 turns OFF) where is 180° opposite from the standby position /1. In the 1st folding operation for the subsequent set, M18 rotates in the reverse direction [14] and the crank [4] also rotates 180° in the reverse direction to conduct the 1st folding operation.

The 2nd folding operation is operated as in the 1st folding operation.



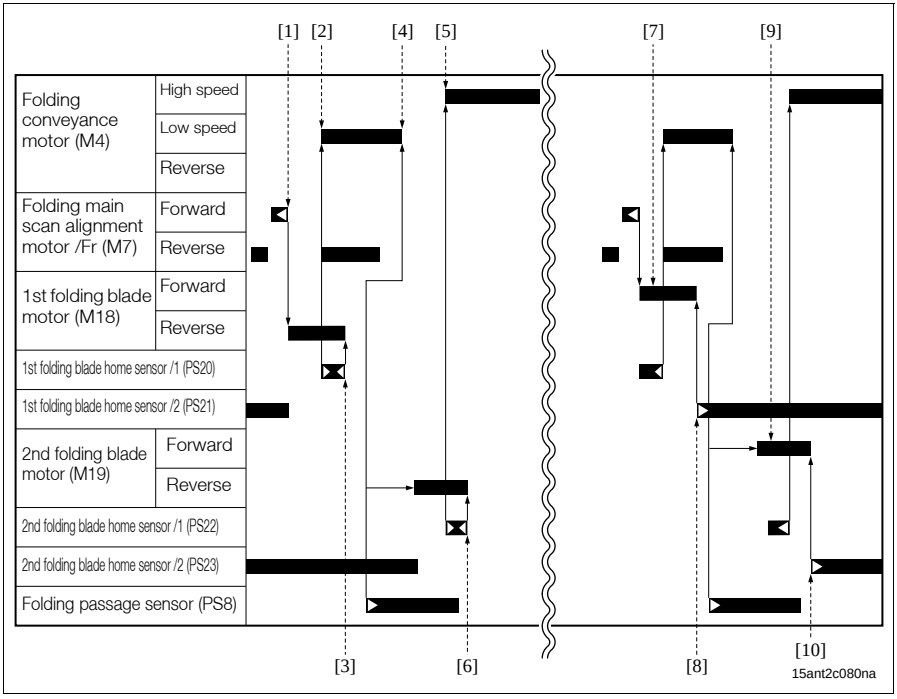
[1] Standby position /2
[2] Projecting position
[3] 1st folding blade home sensor /2 (PS21)
[4] Crank
[5] Standby position /1
[6] 1st folding blade home sensor /1 (PS20)
[7] Actuator
[8] 1st folding blade
[9] Paper
[10] Folding roller /1
[11] Folding roller /2
[12] Paper inserted
[13] Rotational direction to the standby position /2
[14] 1st folding for the subsequent set

(2) Control

When the folding main scan alignment motor /Fr (M7) stops rotating at the completion of the paper alignment operation, the 1st folding blade motor (M18) turns ON and starts rotating in the reverse direction. The 1st folding blade folds and inserts the paper between the folding rollers /1 and /2. When the 1st folding blade home sensor /1 (PS20) turns ON, the folding conveyance motor (M4) turns ON to conduct the 1st folding [2]. M18 stops when PS20 turns OFF. Then, M4 turns OFF and the 1st folding operation is completed [4] after a specified period of time since the folding passage sensor (PS8) detects the leading edge of paper.

After a specified period of time since PS8 turns ON, the 2nd folding blade motor (M19) turns ON and rotates in the reverse direction to start the 2nd folding operation. When the 2nd folding blade home sensor /1 (PS22) turns ON, M4 rotates in high speed to perform the 2nd folding, and then the tri-folded paper is conveyed to the tri-folding exit. M19 stops when PS22 turns OFF.

In the 1st folding operation for the subsequent set, M18 rotates in the forward direction to conduct the 1st folding [7] and stops rotating when the 1st folding blade home sensor /2 (PS21) turns ON [8]. In the 2nd folding operation, M19 rotates in the forward direction to conduct the 2nd folding [9] and stops rotating when the 2nd folding blade home sensor /2 (PS23) turns ON [10].



[1] Paper alignment operation completed
[2] 1st folding
[3] 1st folding blade motor (M18) stopped
[4] 1st folding completed
[5] 2nd folding
[6] 2nd folding blade motor (M19) stopped
[7] 1st folding by M18 rotating the forward direction
[8] M18 stopped
[9] 2nd folding by M19 rotating the forward direction
[10] M19 stopped

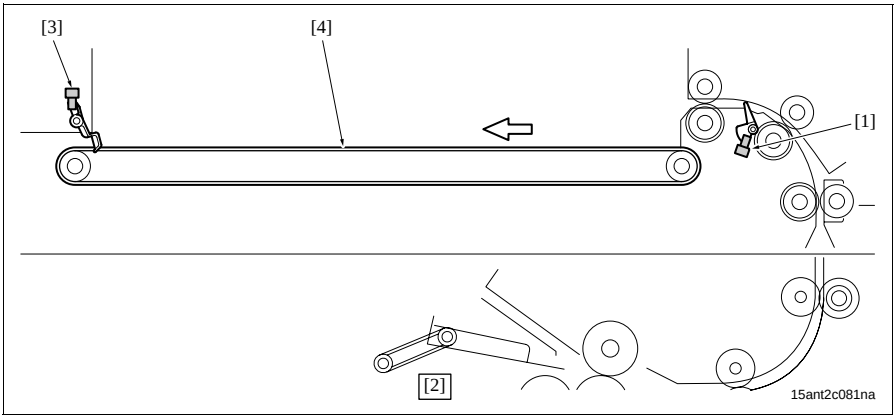
C. Tri-folding exit control

(1) Operation

In the multi letter folding exit, the driving force of the folding conveyance motor (M4) is transmitted via the tri-folding exit clutch (CL1).

CL1 turns ON and the exit belt [4] is driven approximately 7 mm to convey the paper to the front side for every paper exit.

The tri-folding paper full sensor (PS10) [3] detects the paper when it is reached at the front, and then the main body displays the message on its operation panel.



[1] Tri-folding exit sensor (PS9)

[2] Right side view

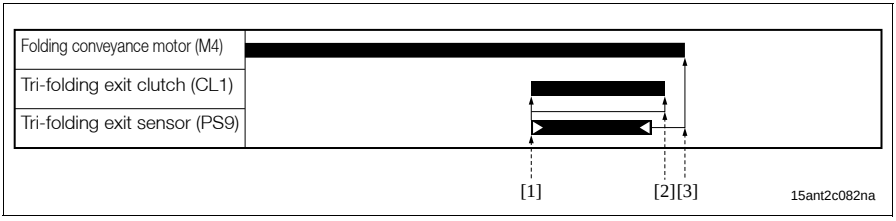
[3] Tri-folding paper full sensor (PS10)

[4] Exit belt

(2) Control

The tri-folding exit clutch (CL1) turns ON and drives the exit belt [1] and stops it [2] after a specified period of time when the tri-folding exit sensor (PS9) detects the leading edge of paper.

The folding conveyance motor (M4) stops [3] after a specified period of time since PS9 detects the trailing edge of paper.



[1] Exit belt driven

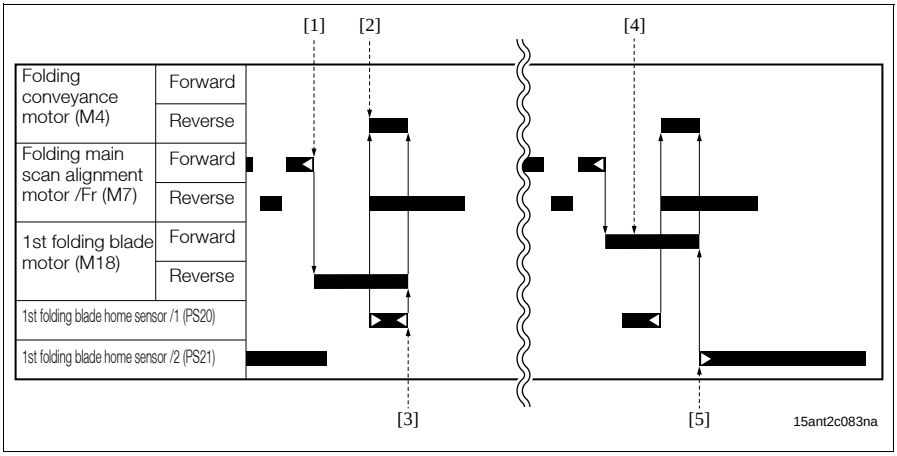
[2] Exit belt stopped

[3] Folding conveyance motor (M4) stopped

D. Center folding control

When the folding main scan alignment motor /Fr (M7) stops at the completion of the paper alignment operation, the 1st folding blade motor (M18) turns ON and rotates in the reverse direction [2] to let the 1st folding blade insert the paper between the folding rollers /1 and /2. When the 1st folding blade home sensor /1 (PS20) turns ON, the folding conveyance motor (M4) rotates in the reverse direction to rotate the folding rollers /1 and /2 in the reverse direction to release the paper. When PS20 turns OFF, M18 and M4 stop rotating [3].

In the folding operation for the subsequent set, M18 rotates in the forward direction [4] and it stops when the 1st folding blade home sensor /2 (PS21) turns ON [5].



[1] 1st folding blade is projected with the paper

[2] Folding conveyance motor (M18) rotating the reverse direction

[3] M18 and M4 stopped

[4] M18 rotating the forward direction

[5] M18 rotating the reverse direction

6.3.4 Folding sub scan alignment control

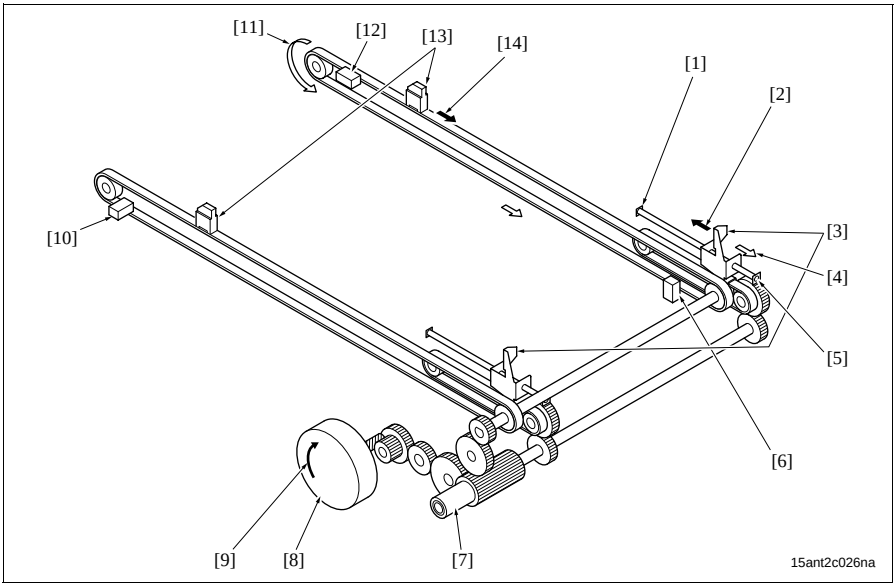
A. Mechanism

The folding sub scan alignment operation is conducted in the multi letter folding mode and is conducted with the folding exit claws [13] and the folding alignment stoppers /Rt [3] driven by the folding sub scan alignment exit motor (M8) [8].

The folding exit claws move to the right [14] and the folding alignment stoppers /Rt move to the left [2] when M8 rotates in the reverse direction [9]. The folding alignment stoppers /Rt are contacted with the alignment stopper [1] and stopped by the torque limiter [7]. The folding exit claws move to the positions for the paper width of A4R or 8.5 x 11R and conduct the folding sub scan alignment operation, and then the folding is conducted.

In the multi center folding mode and the saddle stitching mode, M8 rotates in the forward direction to move the folding exit claws to the left [11] after the folding operation. Once the folding exit claws make a round, they conduct the paper exit operation to the saddle stitching section. At the time, the folding alignment stoppers /Rt moving to the right [4] are contacted with the alignment stopper [5] and stopped by the torque limiter [7].

The home position of the folding exit claws in the alignment operation is detected by the folding sub scan alignment home sensor (PS56) [12]. The initial position and the center folding exit operation are detected by the folding exit home sensor (PS24) [6].

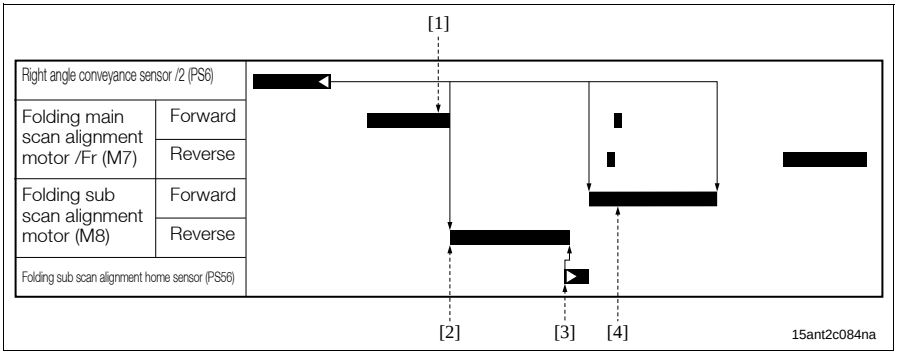


[1] Alignment stopper
[2] Direction at the alignment operation (to the left)
[3] Folding alignment stoppers /Rt
[4] Direction at the center folding exit operation (to the right)
[5] Home position stopper
[6] Folding exit home sensor (PS24)
[7] Torque limiter
[8] Folding sub scan alignment exit motor (M8)
[9] M8 rotated in the reverse direction
[10] Folding sensor /2 (PS44)
[11] Direction at the center folding exit operation
[12] Folding sub scan alignment home sensor (PS56)
[13] Folding exit claws
[14] Direction at the alignment operation (to the right)

B. Folding sub scan alignment control

The folding sub scan alignment exit motor (M8) rotates in the reverse direction to conduct the alignment operation in the sub scan direction [2] after a specified period of time since the right angle conveyance sensor /2 (PS6) detects the trailing edge of paper and the alignment operation in the main scan direction is conducted [1]. When the folding sub scan alignment home sensor (PS56) detects the folding exit claws, M8 conducts the alignment by pressing the side of the paper, and then it stops [3]

The M8 conducts the shelter operation and stops [4] after a specified period of time since PS6 detects the trailing edge of paper.



[1] Alignment operation in the main scan direction

[2] Alignment operation in the sub scan direction

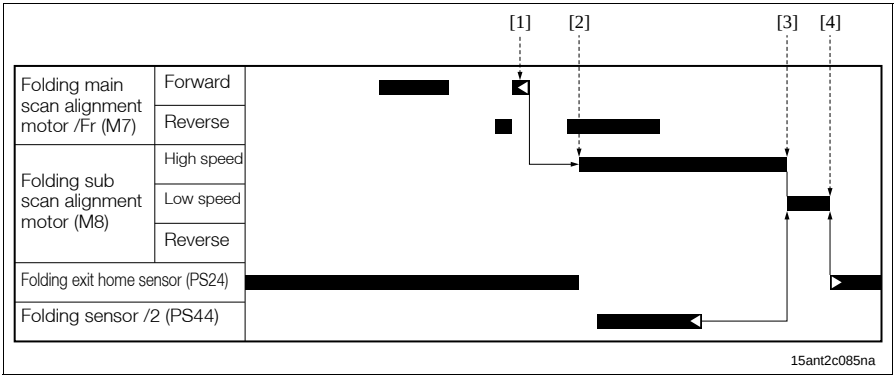
[3] M8 stopped

[4] Shelter operation

C. Center folding exit operation

The folding sub scan alignment exit motor (M8) does not conduct the alignment operation in the sub scan direction in the multi center folding/saddle stitching mode. It conducts the operation only when it exits the paper to the saddle stitching section.

M8 drives the folding exit claws to conduct the paper exit operation [2] to the saddle stitching section after a specified period of time since the folding main scan alignment motor /Fr (M7) completes the realignment operation in the main scan direction [1] (after the center folding operation). After a specified period of time since the folding sensor /2 (PS44) detects the trailing edge of paper, M8 rotates in low speed [3] and conduct the home position search operation, and then it stops [4] when the folding exit home sensor (PS24) turns ON.



[1] Realignment operation in the main scan direction

[2] Paper exit operation started

[3] M8 switched to the low speed

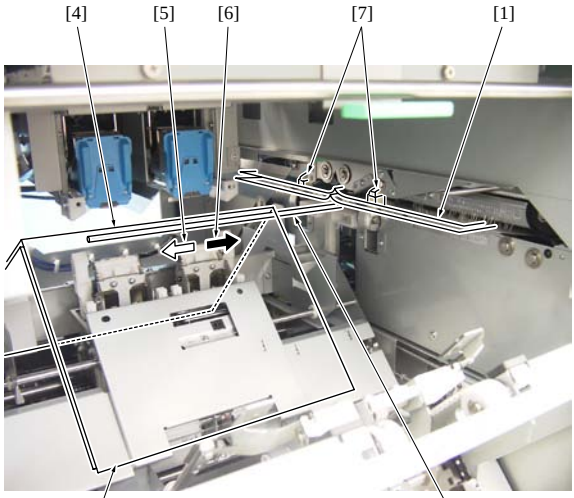
[4] Stopped at home position

6.3.5 Guide shaft control

A. Mechanism

The guide shaft [2] holds the fold line [4] from the bottom and makes certain of the stack [3] in the saddle stitching section when the folding exit claws [7] exit the folded paper [1] to the saddle stitching section.

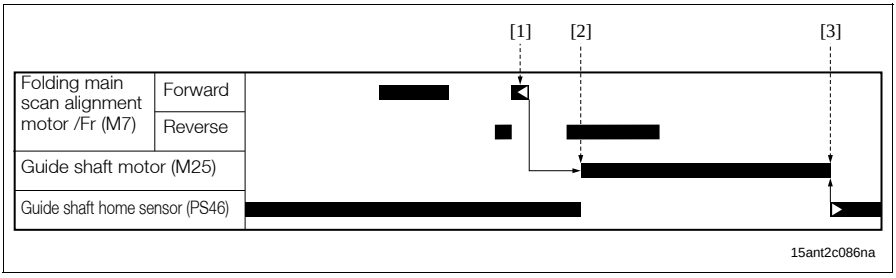
The guide shaft is projected [5] in sync with the paper exit only when the first folded paper for each set is exited and put away immediately to the folding section [6]. In the subsequent paper exit, the guide shaft does not operate because the paper [3] stacked in the saddle stitching section works as the guide.



[1] Folded paper
[2] Guide shaft
[3] Stacked paper
[4] Fold line
[5] Projection direction of the guide shaft
[6] Storage direction of the guide shaft
[7] Folding exit claws

B. Guide shaft control

The guide shaft motor (M25) turns ON [2] and the guide shaft is projected after a specified period of time since the folding main scan alignment motor /Fr (M7) completes the realignment operation in the main scan direction [1] (after the folding operation). The guide shaft conducting the back and forth operation by the belt rotation stops when the guide shaft home sensor (PS46) turns ON [3].



[1] Realignment operation in the main scan direction
[2] Guide shaft projected
[3] Guide shaft motor (M25) stopped

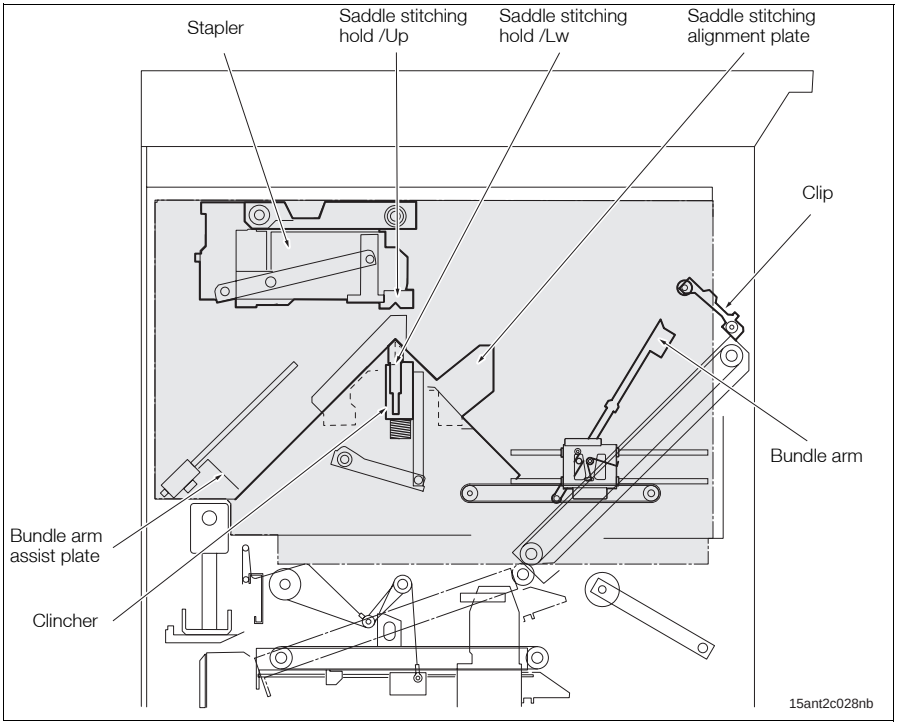
C. Folding unit lock control

During the print operation, the folding unit lock solenoid (SD8) locks the folding unit to prevent the guide shaft or the folding exit claws from damage due to pulling out the folding unit by mistake.

When the paper get jammed, the positions of the guide shaft and the folding exit claws are monitored. SD8 turns OFF and releases the lock only when both the folding exit home sensor (PS24) and the guide shaft home sensor (PS46) detect the home position.

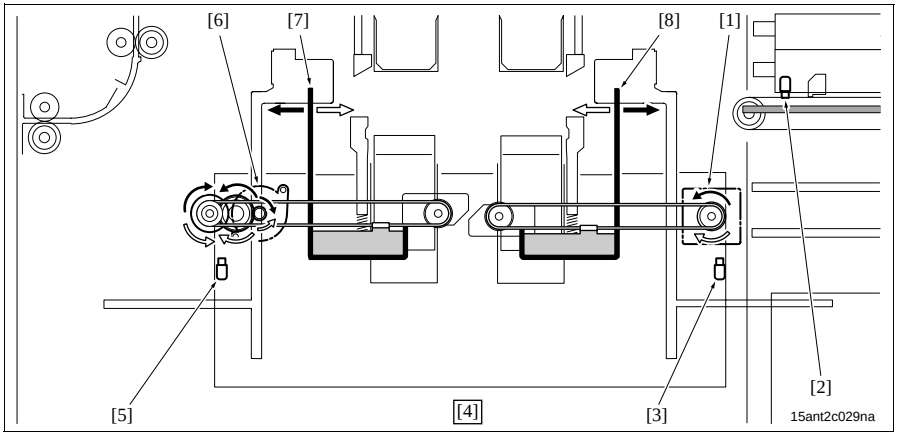
7. SADDLE STITCHING SECTION

⚠ 7.1 Composition



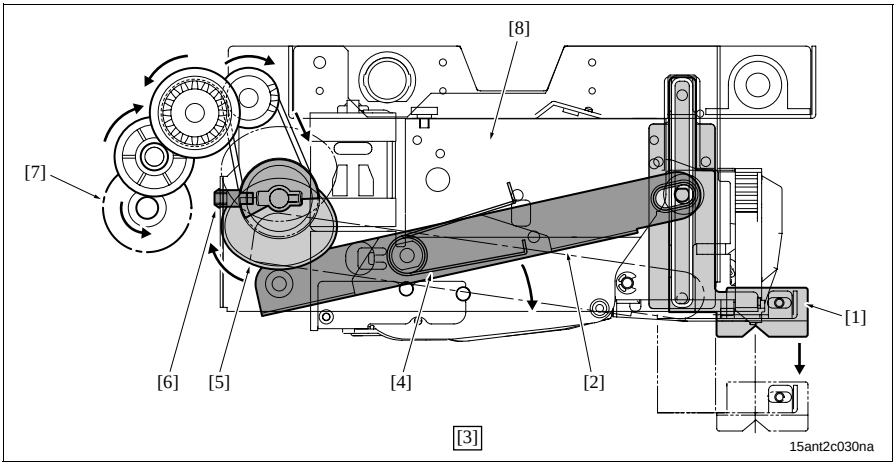
7.2 Drive

7.2.1 Saddle stitching alignment drive



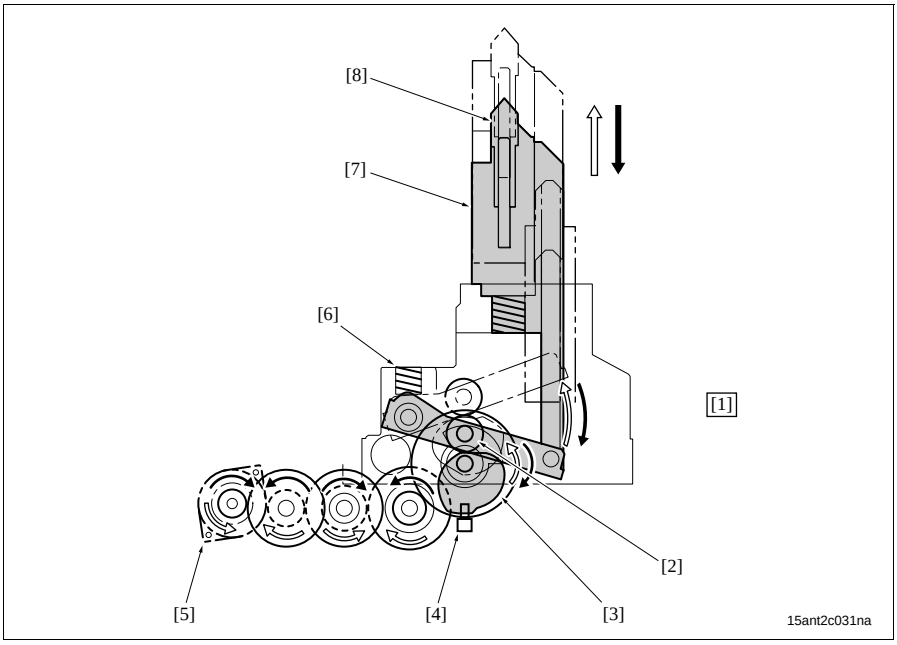
[1] Saddle stitching alignment motor /Rt (M9)
[2] Folding sensor /2 (PS44)
[3] Saddle stitching alignment home sensor /Rt (PS28)
[4] Front side view
[5] Saddle stitching alignment home sensor /Lt (PS29)
[6] Saddle stitching alignment motor /Lt (M16)
[7] Saddle stitching alignment plate /Lt
[8] Saddle stitching alignment plate /Rt

7.2.2 Saddle stitching hold drive



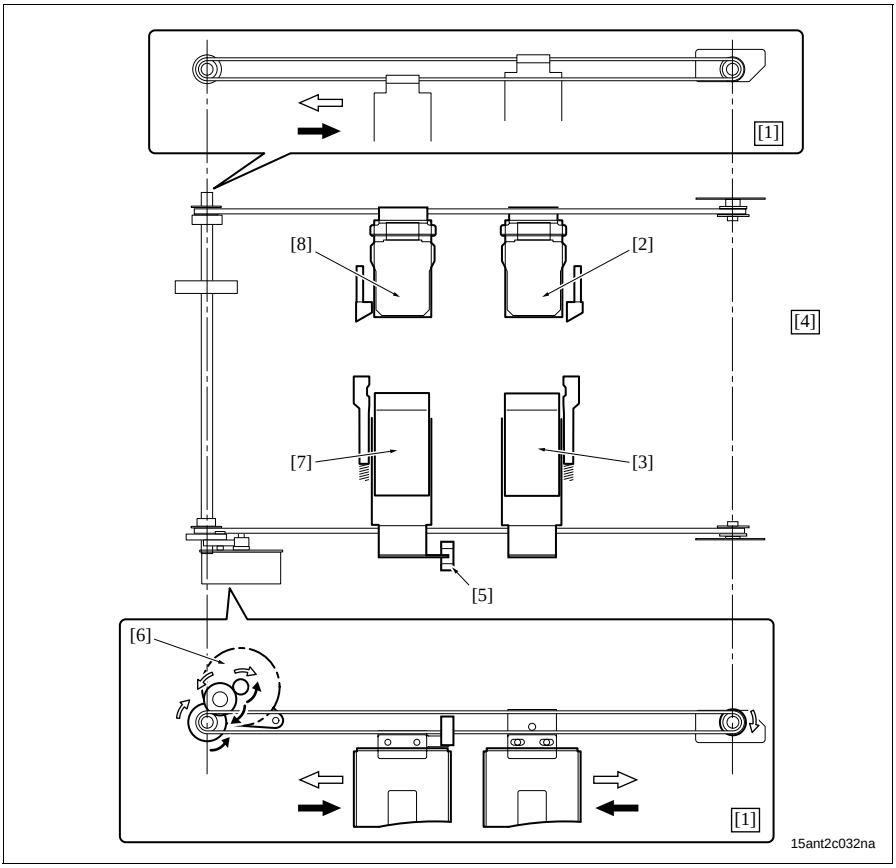
[1] Saddle stitching hold /Up
[2] Arm
[3] Left side view
[4] Spring
[5] Eccentric cam
[6] Saddle stitching press home sensor (PS27)
[7] Saddle stitching hold motor (M21)
[8] Stapler

7.2.3 Clincher up down drive



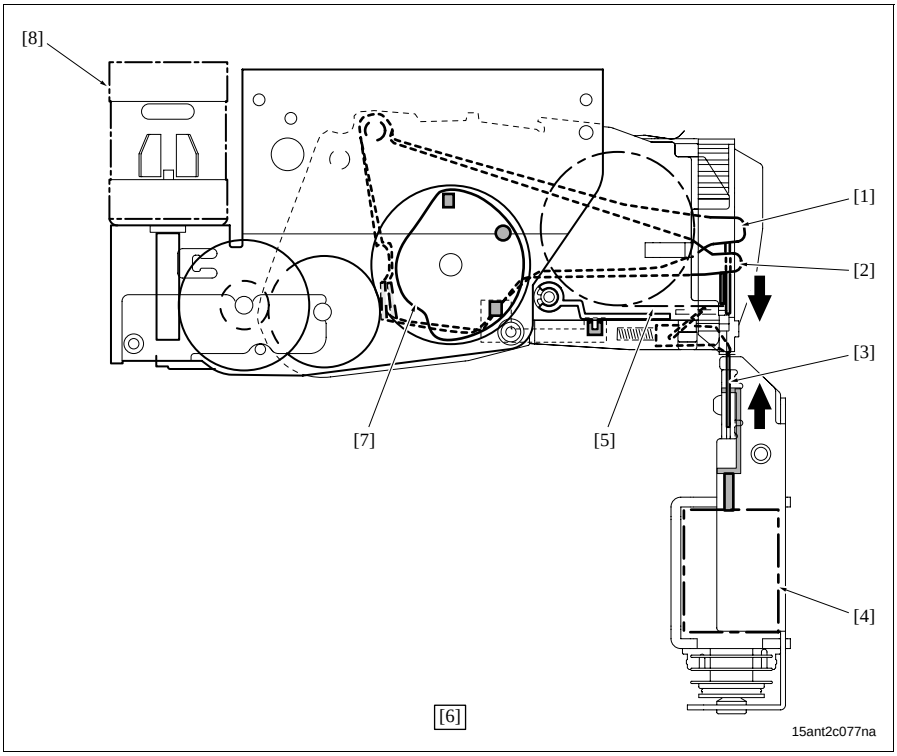
[1] Left side view
[2] Roller
[3] Eccentric cam
[4] Clincher up down home sensor (PS26)
[5] Clincher up down motor (M20)
[6] Spring
[7] Clinchers /Rt, /Lt
[8] Saddle stitching hold /Lw

7.2.4 Stapler/clincher movement drive



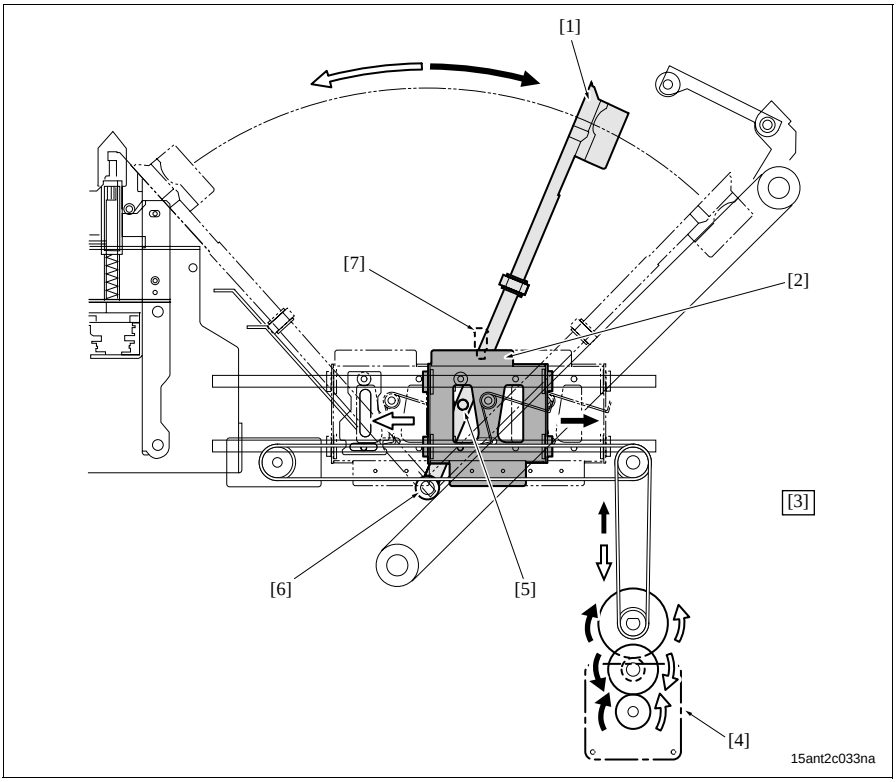
[1] Top side view
[2] Stapler /Rt
[3] Clincher /Rt
[4] Front side view
[5] Stapler movement home sensor (PS25)
[6] Stapler movement motor (M15)
[7] Clincher /Lt
[8] Stapler /Lt

7.2.5 Stapler/clincher drive



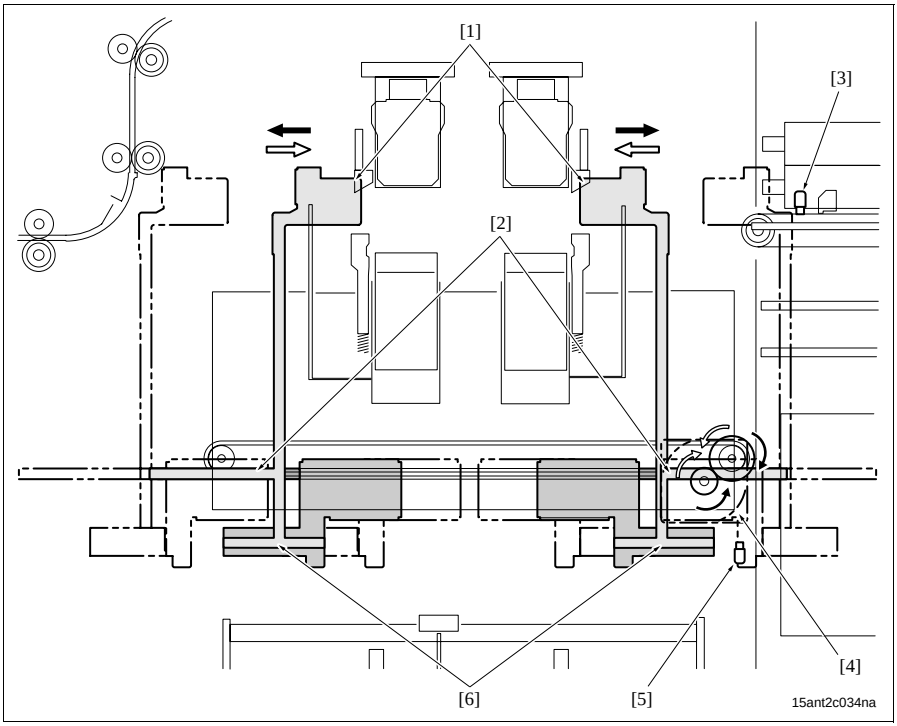
[1] Stapling arm
[2] Staple bending arm
[3] Clincher plate
[4] Clincher solenoids /Rt (SD9) and /Lt (SD10)
[5] Staple
[6] Left side view
[7] Eccentric cam
[8] Stapler motors /Rt (M29), /Lt (M39)

7.2.6 Bundle arm rotation drive



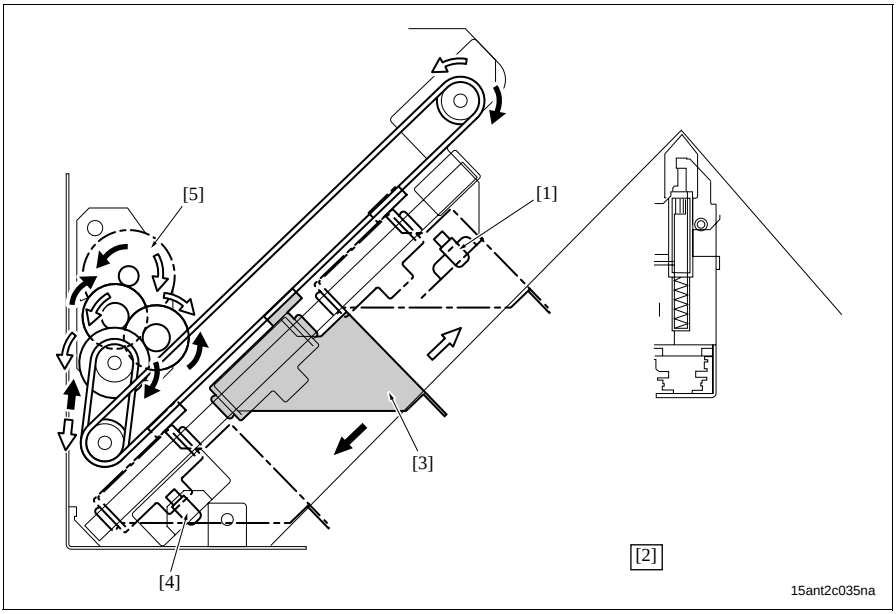
[1] Bundle arm
[2] Slide guide
[3] Left side view
[4] Bundle arm rotation motor (M22)
[5] Guide shaft
[6] Fulcrum shaft
[7] Bundle arm rotation home sensor (PS31)

7.2.7 Bundle arm movement drive



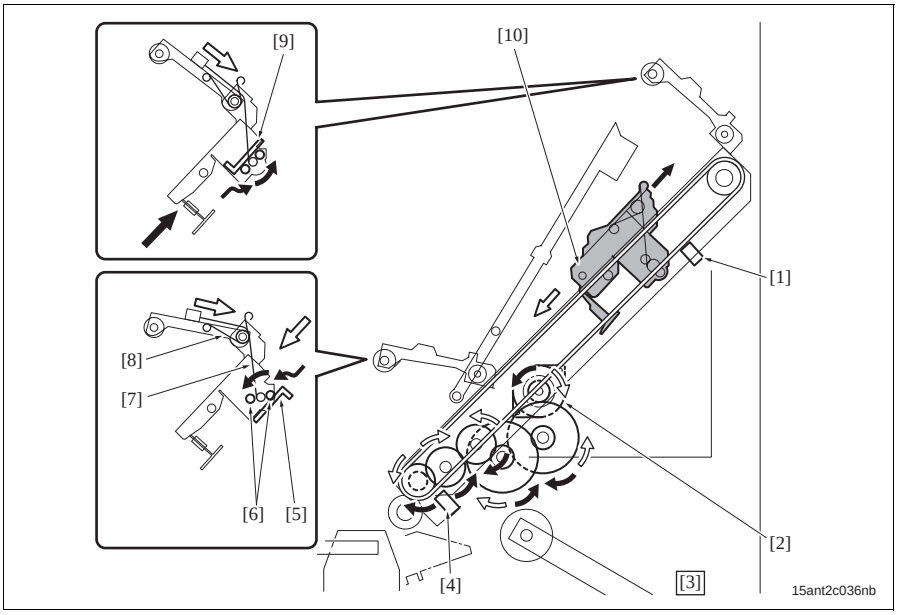
[1] Bundle arm
[2] Guide shaft
[3] Folding sensor /2 (PS44)
[4] Bundle arm motor (M10)
[5] Bundle arm home sensor (PS32)
[6] Fulcrum shaft

7.2.8 Bundle arm assist drive



[1] Bundle arm assist upper limit sensor (PS39)
[2] Left side view
[3] Bundle arm assist plate
[4] Bundle arm assist home sensor (PS38)
[5] Bundle arm assist motor (M26)

7.2.9 Bundle clip drive



[1] Bundle clip upper limit sensor (PS33)
[2] Bundle clip motor (M11)
[3] Left side view
[4] Bundle clip lower limit motor (PS30)
[5] Release plate /Lw
[6] Release roller
[7] Wire
[8] Spring
[9] Release plate /Up
[10] Clip

7.3 Operation

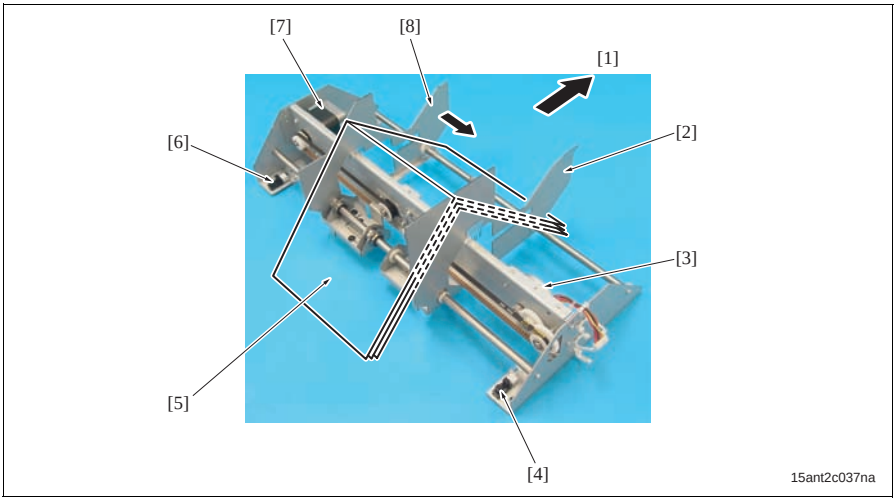
7.3.1 Saddle stitching alignment control

A. Mechanism

In the saddle stitching alignment, the saddle stitching alignment plates /Lt [2] and /Rt [8] align the center folded paper [5] in the sub scan direction.

The saddle stitching alignment motor /Lt (M16) [3] drives the saddle stitching alignment plate /Lt [2] in the sub scan direction via the belt by rotating in the forward and reverse directions. The saddle stitching alignment plate /Lt moves to the position for the appropriate paper size when the main body start signal turns ON, and it does not move during the print operation. It return to the position at the saddle stitching alignment home sensor /Lt (PS29) [4] after the print operation.

The saddle stitching alignment motor /Rt (M9) [7] drives the saddle stitching alignment plate /Rt [8] in the sub scan direction via the belt by rotating in the forward and reverse directions. The alignment operation is conducted by M9 by rotating in the forward and reverse directions every time the center folded paper is conveyed. It return to the position at the saddle stitching alignment home sensor /Rt (PS28) [6] after the print operation.

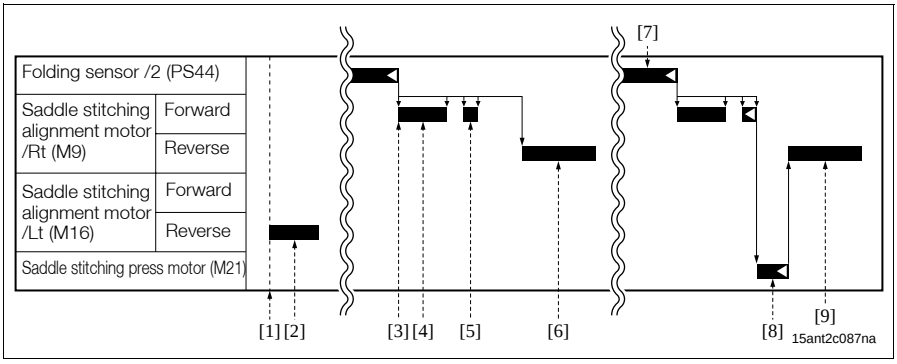


[1] Front side direction
[2] Saddle stitching alignment plate /Lt
[3] Saddle stitching alignment motor /Lt (M16)
[4] Saddle stitching alignment home sensor /Lt (PS29)
[5] Paper
[6] Saddle stitching alignment home sensor /Rt (PS28)
[7] Saddle stitching alignment motor /Rt (M9)
[8] Saddle stitching alignment plate /Rt

B. Control

The saddle stitching alignment motor /Lt (M16) rotates in the reverse direction when the main body start signal [1] turns ON and the saddle stitching alignment plate /Lt moves to the position for the appropriate paper size [2]. The saddle stitching alignment motor /Rt (M9) rotates in the forward direction and the saddle stitching alignment plate /Rt conducts the preliminary alignment operation [4] when the folding sensor /2 (PS44) at the exit of the folding section detects the trailing edge of the paper [3]. Then, M9 rotates in the forward direction to conduct the alignment operation [5] when the paper is stacked at the stapler position. After a specified period of time, M9 rotates in the reverse direction to go back the saddle stitching alignment plate to its home position and stands by for the subsequent set [6].

For the last paper of the set [7], M9 rotates in the reverse direction to go back the saddle stitching alignment plate to its home position when the saddle stitching press motor (M21) [8] is completed with holding the paper.



[1] Main body start signal

[2] Moved for appropriate paper size

[3] Detected the trailing edge of paper

[4] Preliminary alignment operation

[5] Alignment operation

[6] Moved to the home position

[7] Last paper of the set

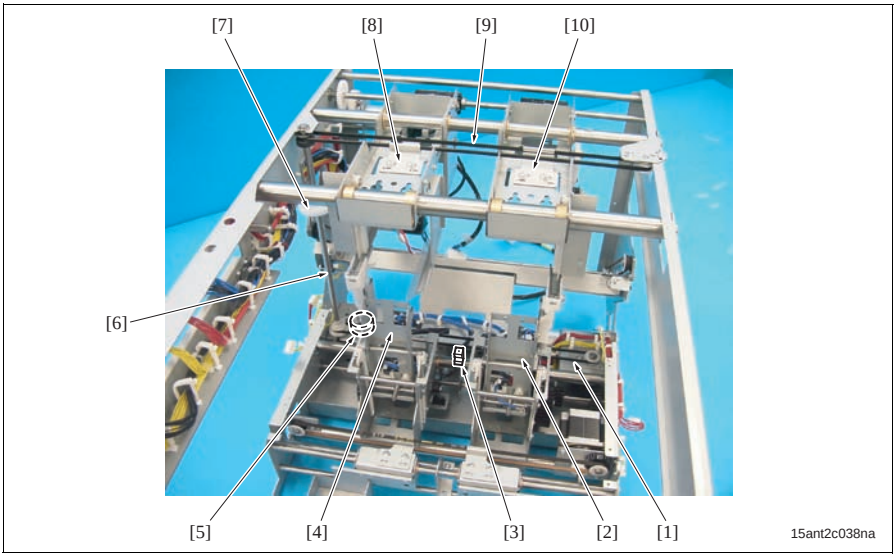
[8] Held the paper with the saddle stitching hold

[9] Moved to the home position

7.3.2 Stapler/clincher movement control

A. Mechanism

The staplers/clinchers move to the stapling position in accordance with the paper size.
The stapling position is different for every paper size to make the stapling distance half of the paper size.
The staplers /Rt [10] and /Lt [8] are fixed to the belt /Up [9] and the clinchers /Rt [2] and /Lt [4] to the belt /Lw [1].
They are moved in the sub scan direction by the stapler movement motor (M15) [5] via the connecting shaft [6].
To prevent the tooth skipping of the belts /Up and /Lw at the maintenance, the gear-shaped rotating knob [7] is provided on the connecting shaft [6]. Rotating the knob, you can manually move the staplers /Rt and /Lt and the clinchers /Rt and /Lt simultaneously.



[1]	Belt /Lw	[6]	Connecting shaft
[2]	Clincher /Rt	[7]	Rotating knob
[3]	Stapler movement home sensor (PS25)	[8]	Stapler /Lt
[4]	Clincher /Lt	[9]	Belt /Up
[5]	Stapler movement motor (M15)	[10]	Stapler /Rt

B. Control

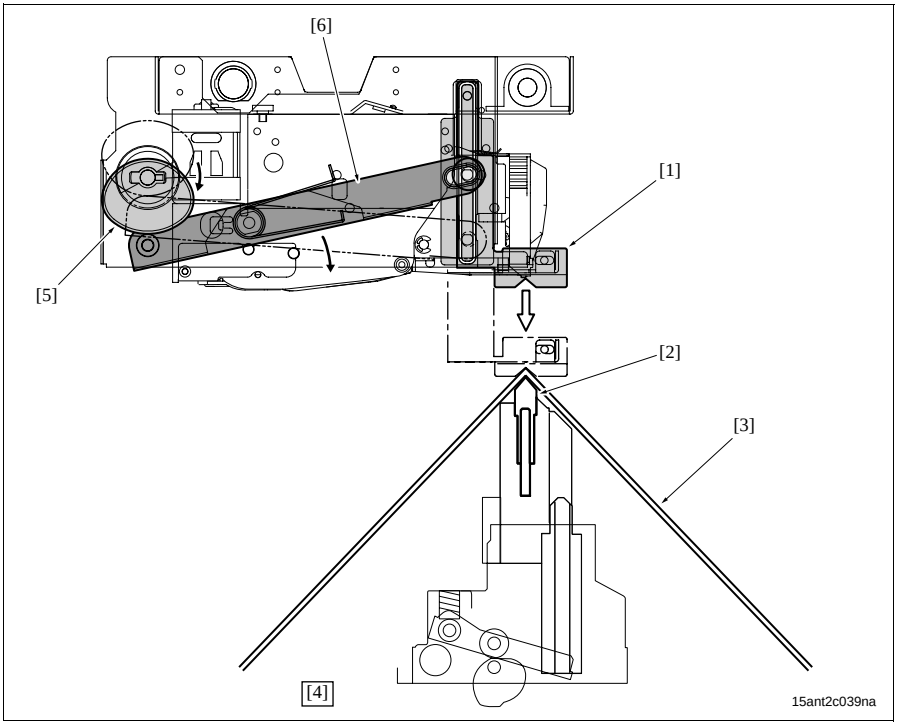
The stapler movement motor (M15) rotates in the forward direction when the main body start signal turns ON and moves the staplers and the clinchers to the position for the appropriate paper size.
They go back to their home position at the end of the printing operation.

7.3.3 Saddle stitching hold control

A. Mechanism

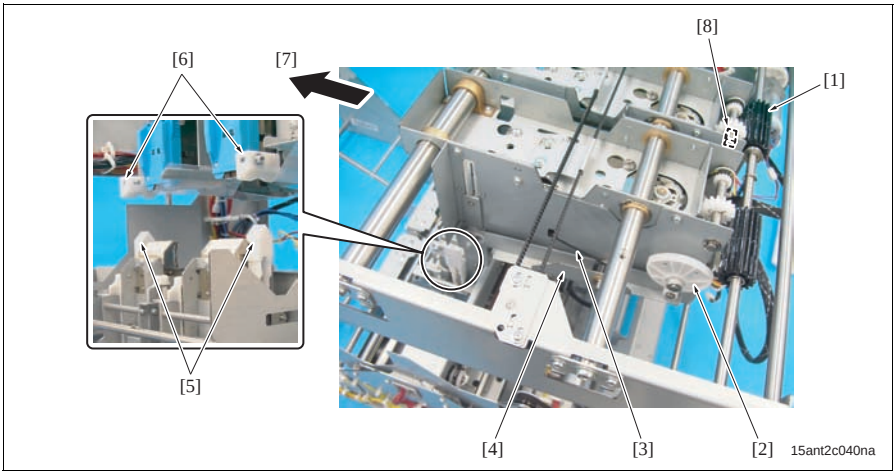
The saddle stitching hold is the mechanism to prevent the paper misalignment at stapling. The saddle stitching hold /Up [1] moves down to the saddle stitching hold /Lw [2] at its lower position and hold the center folded paper [3] at the fold line from both up and down.

The eccentric cam [5] moves the saddle stitching hold /Up [1] up and down via the arm [6].



[1] Saddle stitching hold /Up
[2] Saddle stitching hold /Lw
[3] Center folded paper
[4] Left side view
[5] Eccentric cam
[6] Arm

The saddle stitching hold /Up [6] is enforced by the spring [3] toward the saddle stitching hold /Lw [5]. When the saddle stitching press motor (M21) rotates the eccentric cam [2] via the gear [1], the arm [4] moves along with the shape of the eccentric cam and the saddle stitching hold /Up is lowered by the spring [3].
The saddle stitching hold /Up [6] holding the center folded paper at its lower position is pushed up to its upper position by the saddle stitching hold /Lw [5] during the stapling operation. This allows the paper to be moved from the lower position to the upper position without any misalignment.
The saddle stitching press home sensor (PS27) [8] detects the home position of the eccentric cam.

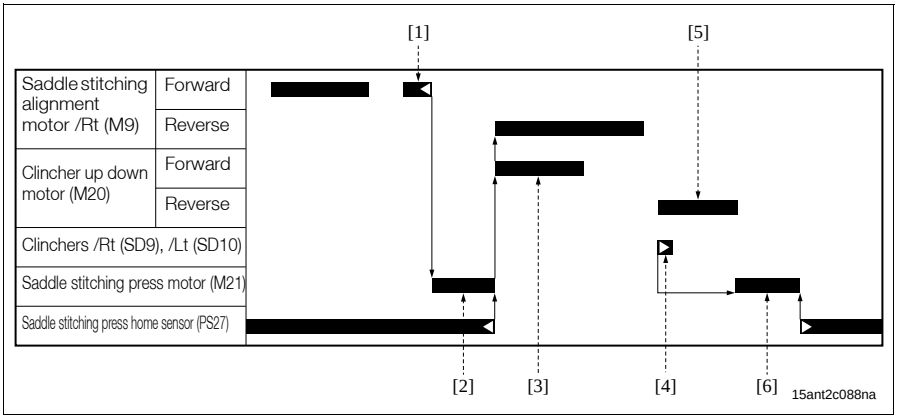


[1] Gear
[2] Eccentric cam
[3] Spring
[4] Arm
[5] Saddle stitching hold /Lw
[6] Saddle stitching hold /Up
[7] Front side direction
[8] Saddle stitching press home sensor (PS27)

B. Control

(1) Saddle stitching mode

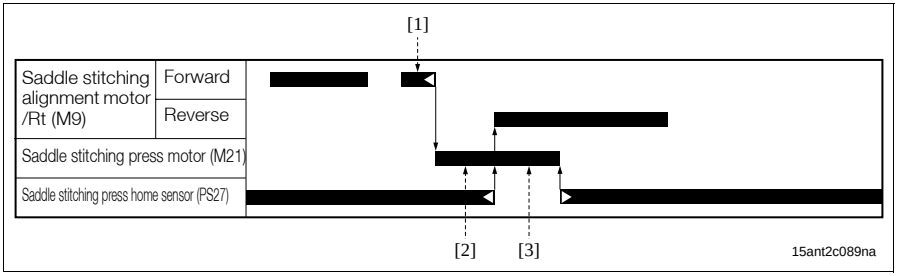
At the end of the paper alignment operation [1], the saddle stitching press motor (M21) rotates to move the saddle stitching hold /Up downward [2] and hold the paper between the saddle stitching holds /Up and /Lw. Then, the clincher up down motor (M20) starts rotating and the saddle stitching hold /Up is pushed up by the saddle stitching hold /Lw while holding the paper [3]. M20 rotates in the reverse direction and lowers the saddle stitching hold /Lw [5] when the clinching operation [4] is started. The saddle stitching hold /Up is also lowered by the spring. M21 turns ON and go back the saddle stitching hold /Up to its standby position [6] after a specified period of time since the clinching operation is started.



[1] Alignment operation
[2] Saddle stitching hold /Up moved down
[3] Saddle stitching hold /Lw moved up
[4] Clinching operation
[5] Saddle stitching hold /Lw moved down
[6] Saddle stitching hold /Up moved up

(2) Multi center folding mode

At the end of the paper alignment operation [1], the saddle stitching press motor (M21) rotates to move the saddle stitching hold /Up downward [2] and stack the paper securely. Then, M21 keeps rotating to move the saddle stitching hold /Up upward to its standby position [3].



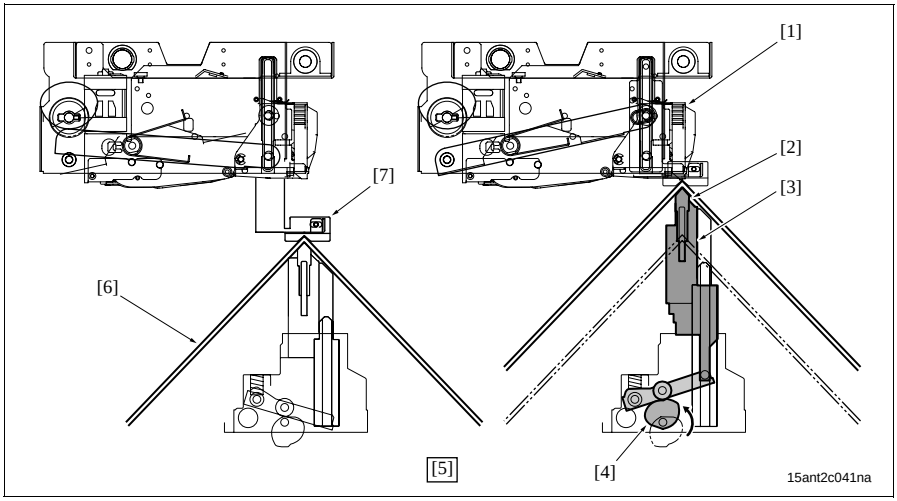
[1] Alignment operation
[2] Saddle stitching hold /Up moved down
[3] Saddle stitching hold /Up moved up

7.3.4 Clincher up down control

A. Mechanism

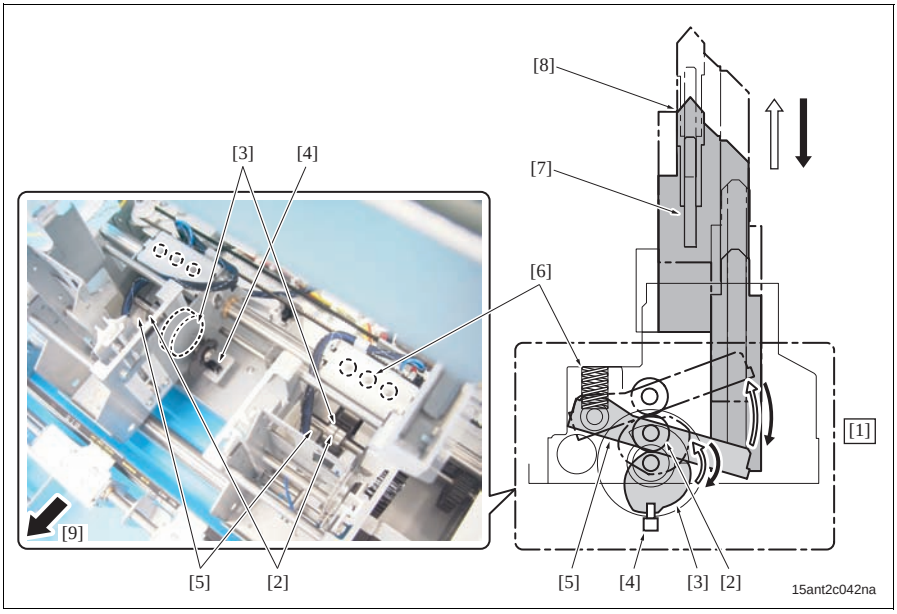
The clincher shelters at the lower position to obtain space between the stapler and the clincher when the paper is conveyed between them.

After the alignment operation, the saddle stitching hold /Up [7] moves down and holds the center folded paper [6]. Then the eccentric cam [5] drives the saddle stitching hold /Lw [2] and the clincher [3] to push up the saddle stitching hold /Up [7] to the position where the stapler [1] is positioned while holding the center folded paper.



[1] Stapler
[2] Saddle stitching hold /Lw
[3] Clincher
[4] Eccentric cam
[5] Left side view
[6] Center folded paper
[7] Saddle stitching hold /Up

The clincher [7] moves down to the lower position by its own weight and moves upward by the clincher up down motor (M20).
The roller [2] attached to the arm [5] is pushed up and the clincher is contacted with the stapler when M20 rotates the eccentric cam [3]. The paper between the clincher and the stapler is hold securely by the spring [6].
Once the stapling operation is completed, M20 rotates in the reverse direction to go back the eccentric cam, and then the clincher moves down by its own weight.



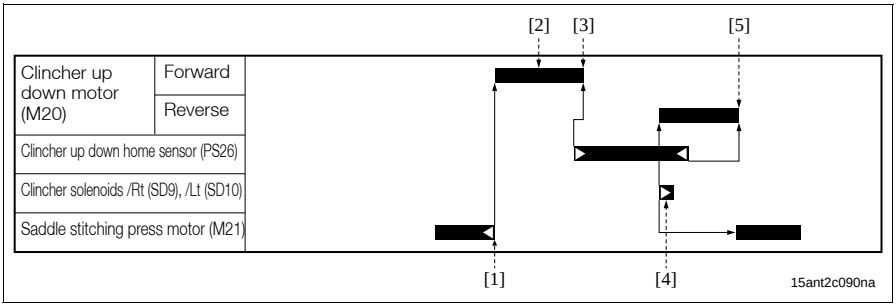
[1] Left side view
[2] Roller
[3] Eccentric cam
[4] Clincher up down home sensor (PS26)
[5] Arm
[6] Spring
[7] Clinchers /Rt, /Lt
[8] Saddle stitching hold /Lw
[9] Front side direction

B. Control

The clincher moves up or down only in the saddle stitching mode.

Once the saddle stitching press motor (M21) moves down the saddle stitching hold /Up [1], the clincher up down motor (M20) rotates in the forward direction to move up the clinchers /Rt and /Lt and the saddle stitching hold /Lw [2]. M20 is stopped when the clincher up down home sensor (PS26) turns ON.

M20 rotates in the reverse direction to move down the clinchers /Rt and /Lt and the saddle stitching hold /Lw when the clincher solenoids /Rt (SD9) and /Lt (SD10) starts the clinching operation [4]. They are stopped at the lower position [5] when PS26 turns OFF.



[1] Saddle stitching hold /Up stopped at lower position

[2] Clinchers /Rt and /Lt moved up

[3] Clinchers /Rt and /Lt stopped at the upper position

[4] Clinching operation

[5] Clinchers /Rt and /Lt stopped at lower position

7.3.5 Stapler control

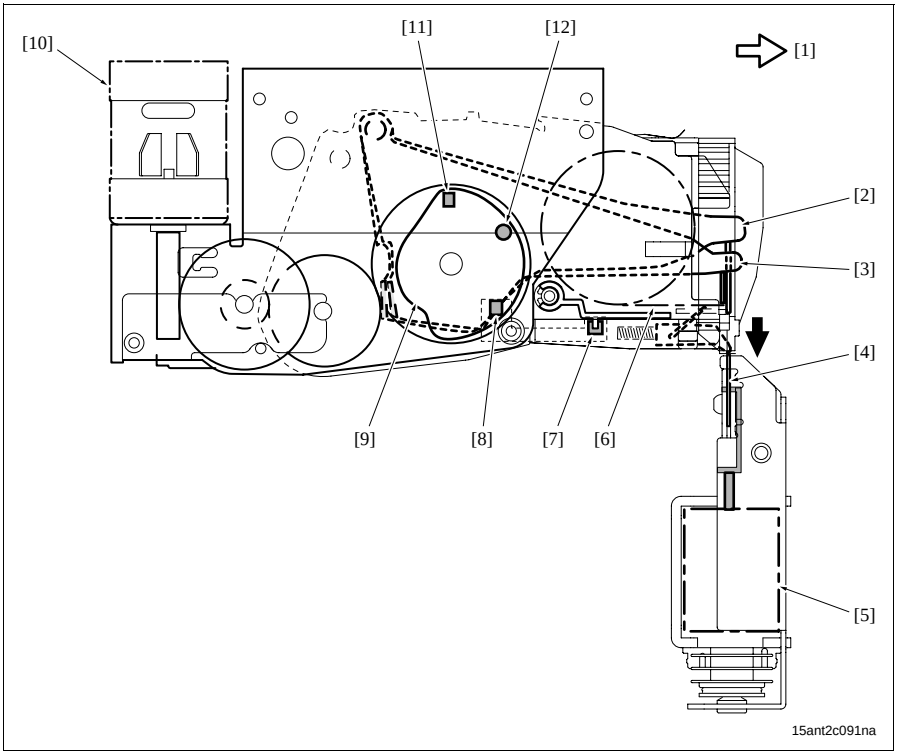
A. Mechanism

The stapler operation is conducted by the stapler motors /Rt (M29) and /Lt (M30) [10] and the clincher solenoids /Rt (SD9) and /Lt (SD10) [5].

The stapler operation is detected by the stapler home sensors /Rt (HS1) and /Lt (HS3) [8] and the clincher start sensors /Rt (HS2) and /Lt (HS4) [11]. HS1, HS2, HS3, and HS4 are hall element sensors and control the position of the magnet [12] of the rotating eccentric cam [9].

M29 and M30 [10] drive the staple bending arm [3] and the stapling arm [2] via the eccentric cam [9]. The staple bending arm bends the rolled staple [6] into the U-shape and the stapling arm staples it toward the clincher. Then the SD9 and SD10 bend the staple by driving the clincher plate [4]. The stapling operation is completed by these operations.

The staple empty switches /Rt (SW1) and /Lt (SW2) [7] detect whether the staple or cartridge is set or not.



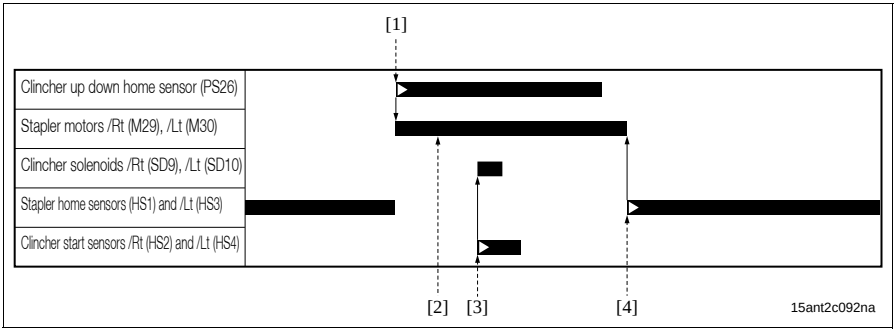
[1] Front side direction
[2] Stapling arm
[3] Staple bending arm
[4] Clincher plate
[5] Clincher solenoids /Rt (SD9), /Lt (SD10)
[6] Staple
[7] Staple empty switches /Rt (SW1) and /Lt (SW2)
[8] Stapler home sensors /Rt (HS1) and /Lt (HS3)
[9] Eccentric cam
[10] Stapler motors /Rt (M29), /Lt (M30)
[11] Clincher start sensors /Rt (HS2) and /Lt (HS4)
[12] Magnet

B. Control

(1) Stapling control

The stapler motors /Rt (M29) and /Lt (30) start the stapling operation [2] when the clincher up down home sensor (PS26) detects that the clinchers /Rt and /Lt are contacted with the stapler unit [1].

The clincher solenoids /Rt (SD9) and /Lt (SD10) bend the staple and the stapling operation is completed when the clincher start sensors /Rt (HS1) and /Lt (HS3) in the stapler unit turn ON [3]. M29 and M30 stop and return to the home position [4] when the stapler home sensors /Rt (HS1) and /Lt (HS3) detects the home position.



[1] Clincher contacted

[2] Stapling operation

[3] Clinching operation

[4] Returned to the home position

(2) Staple and cartridge detection

When the remaining amount of the staple becomes 20 or the cartridge is not set, the staple empty switches /Rt (SW1) and /Lt (SW2) turn ON and the main body displays the message on its operation panel.

7.3.6 Bundle arm control

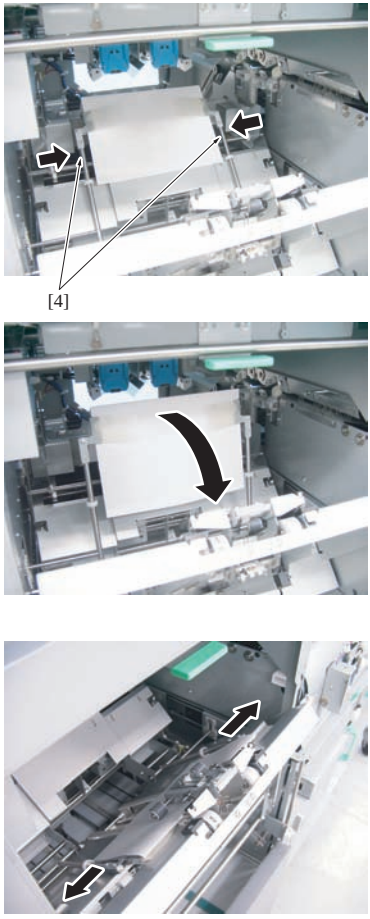
The bundle arm [4] rotates and moves in the sub scan direction.

It rotates to convey the paper from the stapling section to the bundle clip section and moves in the sub scan direction to catch/release the paper.

In the multi center folding mode, the bundle arm rotates to the stapling position after the last paper of the set is conveyed. In the saddle stitching mode, it rotates after the stapling operation.

By moving the bundle arm, the tip of the bundle arm is inserted under the fold line of the paper and the paper is caught [1].

The caught paper is conveyed to the bundle clip section [2] by the rotation of the bundle arm. The bundle arm moves in the outside of the sub scan direction and releases the paper [3] when the bundle clip holds the paper at the folding side.

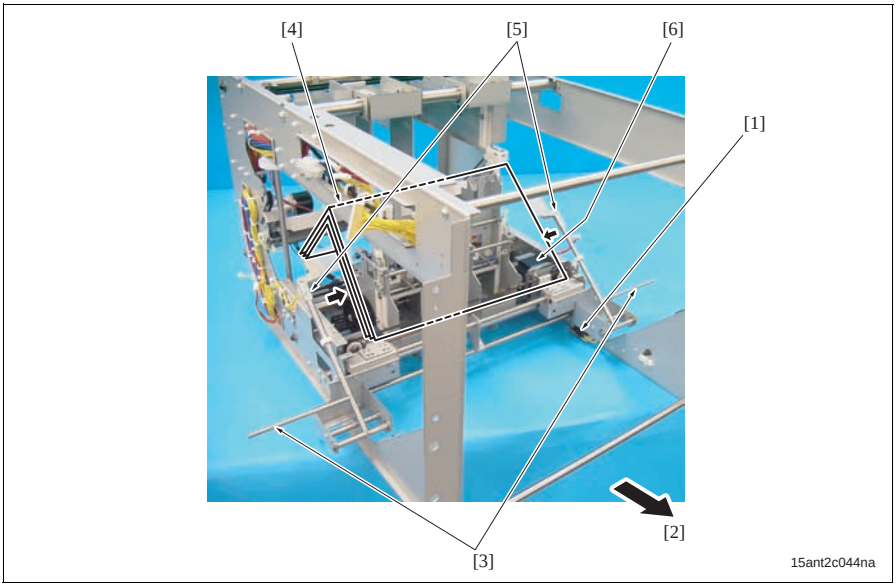


[1] Paper catch
[2] Conveyance
[3] Paper release
[4] Bundle arm

A. Bundle arm movement mechanism

The bundle arm [5] is driven by the bundle arm motor (M10) [6] to catch/release the paper [4] in the sub scan direction via the belt.

The bundle arm home sensor (PS32) [1] detects the home position of the bundle arm.

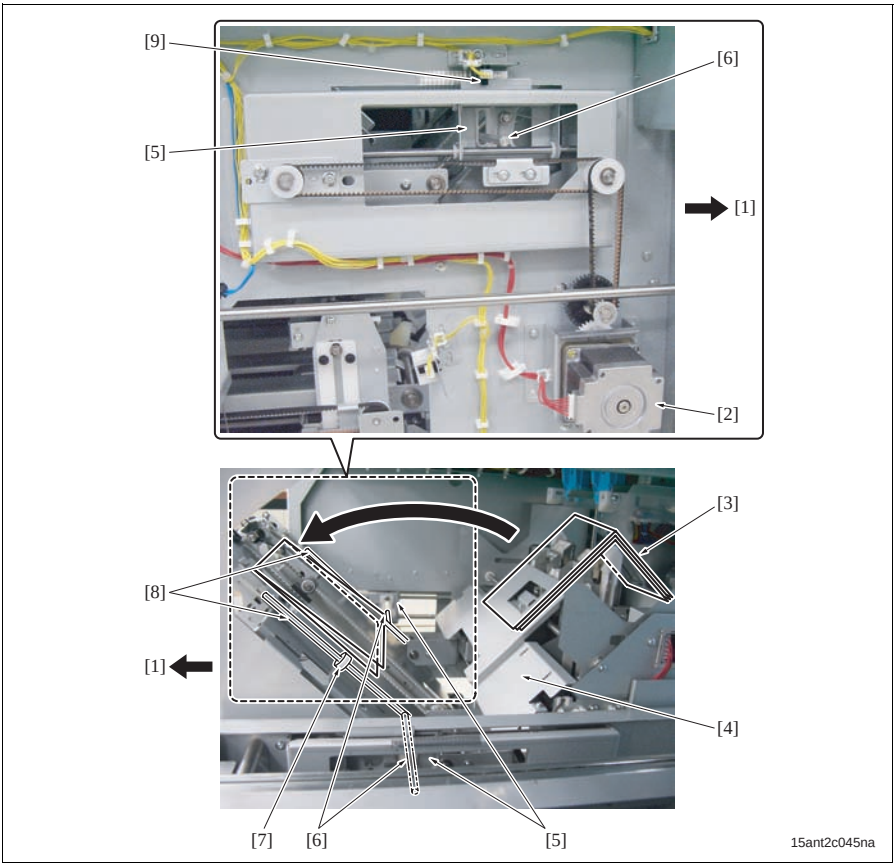


[1] Bundle arm home sensor (PS32)
[2] Front side direction
[3] Guide shaft
[4] Paper
[5] Bundle arm
[6] Bundle arm motor (M10)

B. Bundle arm rotation mechanism

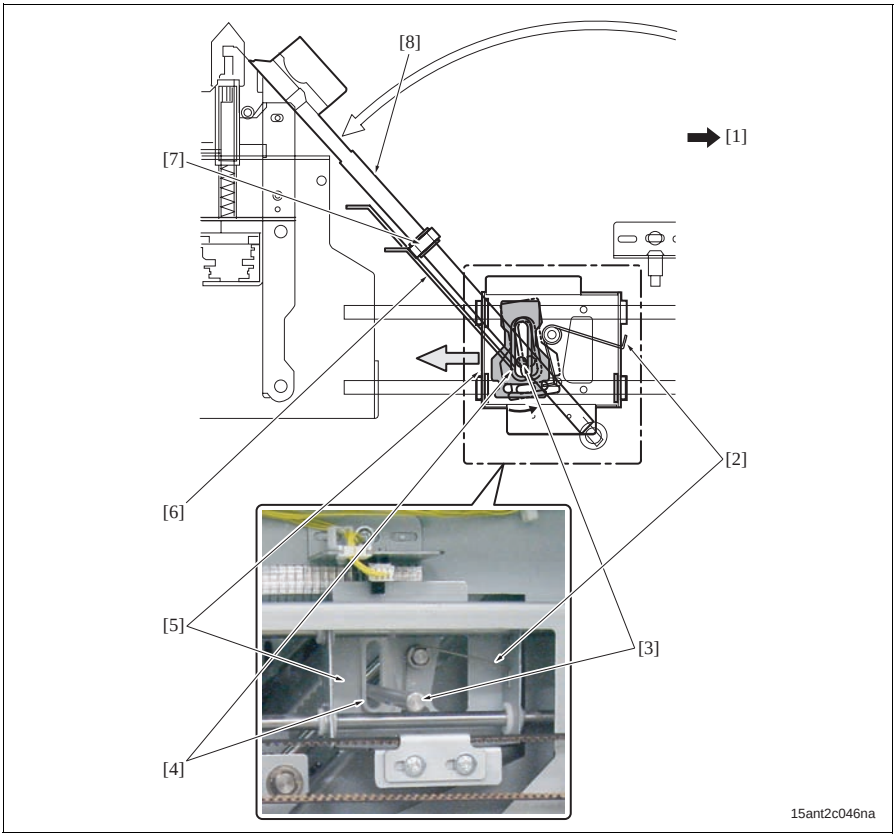
The bundle arm rotation motor (M22) [2] drives the bundle arm [8] via the belt, slide guide [5], and guide shaft [6]. When M22 drives the slide guide [5] in the main scan direction, the guide shaft [6] passing through the long hole of the slide guide is rotated, and then the bundle arm [8] is rotated around the fulcrum. When it is driven to the paper [3] side, M22 stops where the ring [7] is contacted with the guide plate [4].

The bundle arm rotation home sensor (PS31) [9] detects the home position of the bundle arm.



[1] Front side direction
[2] Bundle arm rotation motor (M22)
[3] Paper
[4] Guide plate
[5] Slide guide
[6] Guide shaft
[7] Ring
[8] Bundle arm
[9] Bundle arm rotation home sensor (PS31)

In the rotation drive of the bundle arm [8], the slide guide [5] has to be overrun to be sure to make the ring [7] of the bundle arm contact with the guide plate [6]. To prevent any parts from damage due to the overrun, the guide shaft [3] can be moved by the shock absorbing guide [4] and the spring [2].



[1] Front side direction
[2] Spring
[3] Guide shaft
[4] Shock absorbing guide
[5] Slide guide
[6] Guide plate
[7] Ring
[8] Bundle arm

C. Bundle arm control

The bundle arm motor (M10) rotates in the reverse direction when the main body start signal [1] turns ON and moves the bundle arm to the appropriate position in accordance with the paper size.

The bundle arm rotation motor (M22) rotates in the forward direction to rotate the bundle arm to the stapling section [3] after a specified period of time since the folding sensor /2 (PS44) detects the trailing edge of paper of the last set. It stops the bundle arm in an upright position [4] when the bundle arm rotation home sensor (PS31) turns OFF.

Then, M22 rotates again [5] to drive the bundle arm until it is contacted with the guide plate on the stapling section [6]. The timing for M22 to restart the rotation [5] is different between in the multi center folding mode and in the saddle stitching mode.

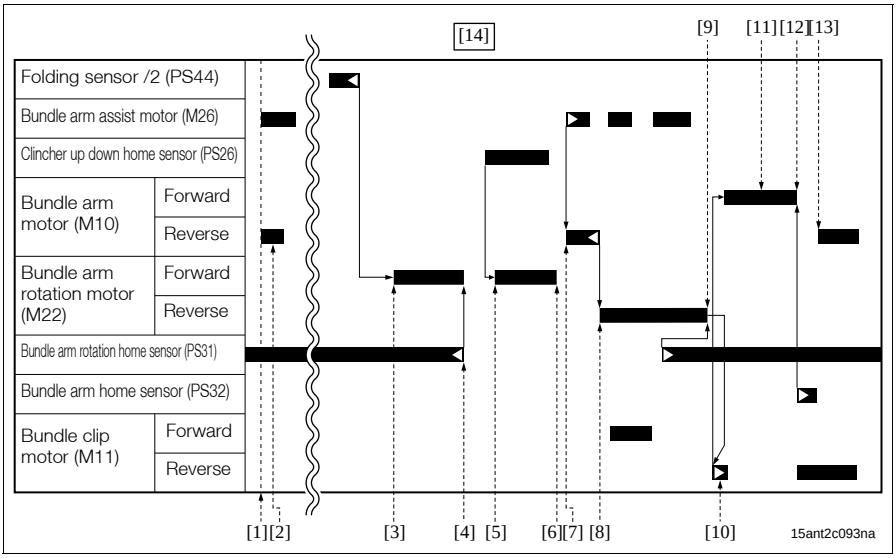
- Multi center folding mode: When the saddle stitching press home sensor (PS27) detects the saddle stitching hold /Up has been moved to the its upper position.
- Saddle stitching mode: After a specified period of time since the clincher up down home sensor (PS26) detects that the clinchers are contacted with the staplers.

M10 inserts the tip of the bundle arm under the fold line of the paper [7] when the bundle arm assist motor (M26) starts the assisting operation by pushing up the trailing edge of paper at the back side and M10 stops after a specified period of time [8].

M22 rotates in the reverse direction to convey the paper to the bundle clip section when M10 stops [8]. It stops after a specified period of time since PS31 turns ON.

M10 rotates in the forward direction to pull out the bundle arm from the paper and take shelter it from the conveyance path [11] after a specified period of time since the bundle clip starts to catch the paper [10]. M10 stops when the bundle arm home sensor (PS32) turns ON [12].

M10 rotates in the reverse direction to go back the bundle arm to its standby position [13] for the subsequent set after a specified period of time since it stops.



[1] Main body start signal

[2] Bundle arm moved in accordance with the paper size

[3] Bundle arm started to rotate

[4] Bundle arm stopped in an upright position

[5] Bundle arm restarted to rotate

[6] Bundle arm contacted with the guide plate

[7] Bundle arm inserted under the fold line

[8] Insertion completed and conveyance started

[9] Conveyance completed

[10] Paper clip caught paper

[11] Bundle arm shelter operation

[12] Shelter completed

[13] Bundle arm moved for the subsequent set

[14] Time chart of the saddle stitching mode

7.3.7 Bundle arm assist control

A. Mechanism

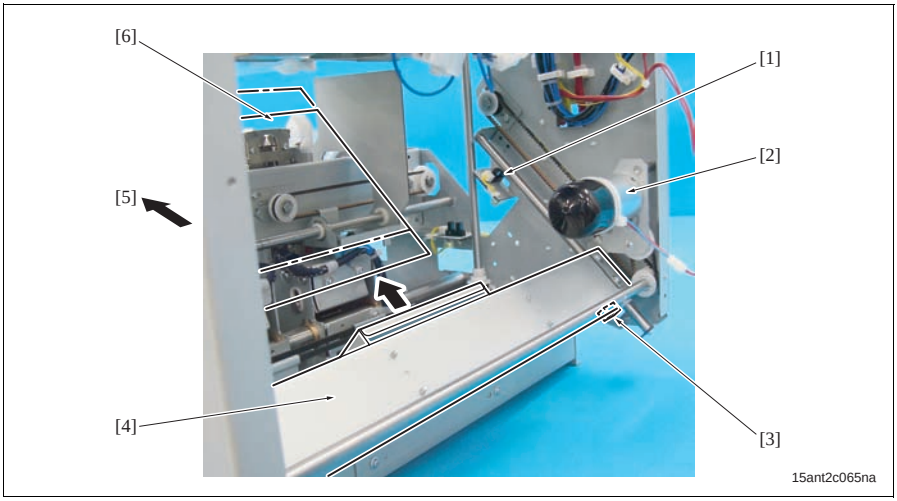
The bundle arm assist mechanism is the mechanism to assist the paper conveyance of the bundle arm rotation drive to be conducted without fault. It pushes up the fore edge side of the paper [6] with the bundle arm assist plate [4] to tilt it to the front.

The bundle arm assist motor (M26) [2] drives the bundle arm plate [4] via the belt.

The bundle arm assist upper limit sensor (PS39) [1] detects the upper home position and the bundle arm assist home sensor (PS38) [3] detects the lower home position.

The bundle arm assist plate [4] waits at the position 5 mm below the fore edge side of the paper during standby. To keep the error to a minimum, the small size paper (313 mm or less) and the large size paper (314 mm or more) are moved to the standby position from the position of PS39 and PS38 respectively since the standby position for the paper is positioned by the driving time of M26 (DC brush motor).

In the bundle arm assist operation, the fore edge side of the paper is pushed up 35 mm (or until PS39 turns ON).



[1] Bundle arm assist upper limit sensor (PS39)
[2] Bundle arm assist motor (M26)
[3] Bundle arm assist home sensor (PS38)
[4] Bundle arm assist plate
[5] Front side direction
[6] Paper

B. Control

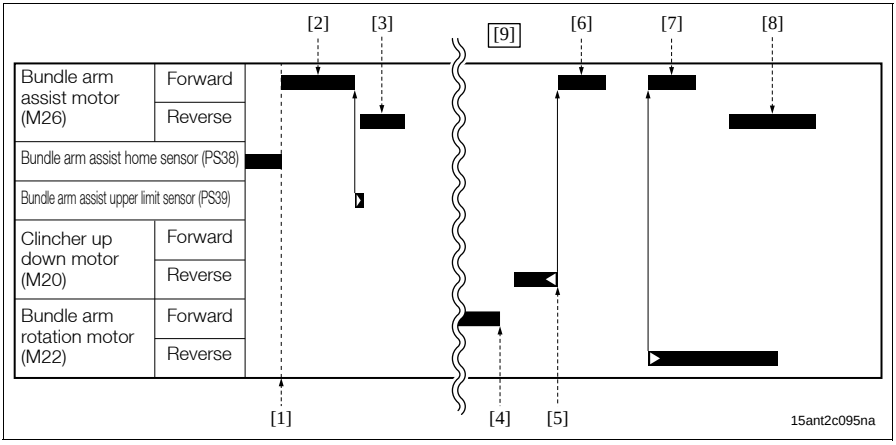
(1) Small size paper (313 mm or less)

For the small size paper, the bundle arm assist motor (M26) rotates in the forward direction when the main body start signal [1] turns ON to drive the bundle arm assist plate at the home position to the position at the bundle arm assist upper limit sensor (PS39) [2]. After a specified period of time, M26 rotates in the reverse direction to drive the bundle arm assist plate from the upper limit position to the standby position in accordance with the paper size [3] and stands by for the paper.

Then, M26 rotates in the forward direction to push up the fore edge side of the paper [6] for assisting the bundle arm to be inserted under the fold line of the paper. The operation timing [6] of M26 is different between in the multi center folding mode and in the saddle stitching mode.

- Multi center folding mode: When the bundle arm is contacted with the guide plate of the stapler section [4] by the bundle arm rotation motor (M22).
- Saddle stitching mode: When the clincher moves downward [5] at the end of the stapling operation.

M26 rotates in the forward direction to assist the bundle arm to convey the paper [7] after a specified period. Then the bundle arm assist plate go back to the standby position and stands by for the subsequent set [8].



[1] Main body start signal

[2] Movement to the upper limit

[3] Bundle arm moved in accordance with the paper size

[4] Bundle arm contacted with the guide plate

[5] Clincher moved down

[6] Assist of the insertion of the bundle arm

[7] Assist of the bundle arm conveyance

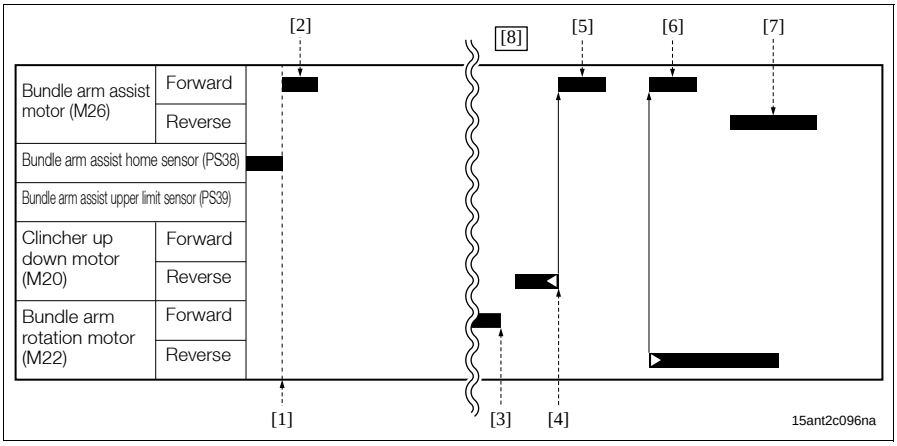
[8] Bundle arm moved in accordance with the paper size

[9] Time chart of the saddle stitching mode

(2) Large size paper (314 mm or more)

For the large size paper, the bundle arm assist motor (M26) rotates in the forward direction when the main body start signal [1] turns ON to drive the bundle arm assist plate to the standby position in accordance with the paper size [2] and stands by for the paper.

The subsequent operation is conducted in the same manner as for the small size paper.



[1] Main body start signal

[2] Bundle arm moved in accordance with the paper size

[3] Bundle arm contacted with the guide plate

[4] Clincher moved down

[5] Assist of the insertion of the bundle arm

[6] Assist of the bundle arm conveyance

[7] Bundle arm moved in accordance with the paper size

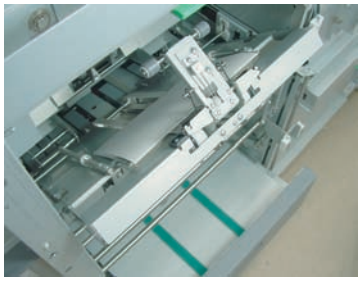
[8] Time chart of the saddle stitching mode

7.3.8 Bundle clip control

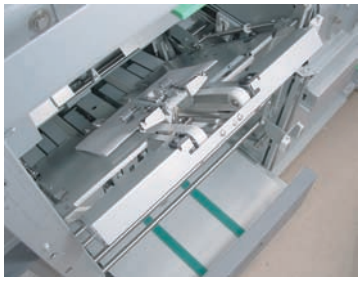
A. Mechanism

The bundle clip is the mechanism to hold the paper that the bundle arm conveyed to the slope and convey the paper to the bundle press stage with its fore edge side to the trimmer section.

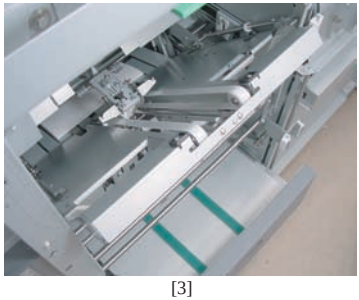
The bundle clip catches, releases, and conveys the paper. It catches the paper at the upper limit position [1], conveys it [2], and then release it at the lower limit position [3].



[1]



[2]



[3]

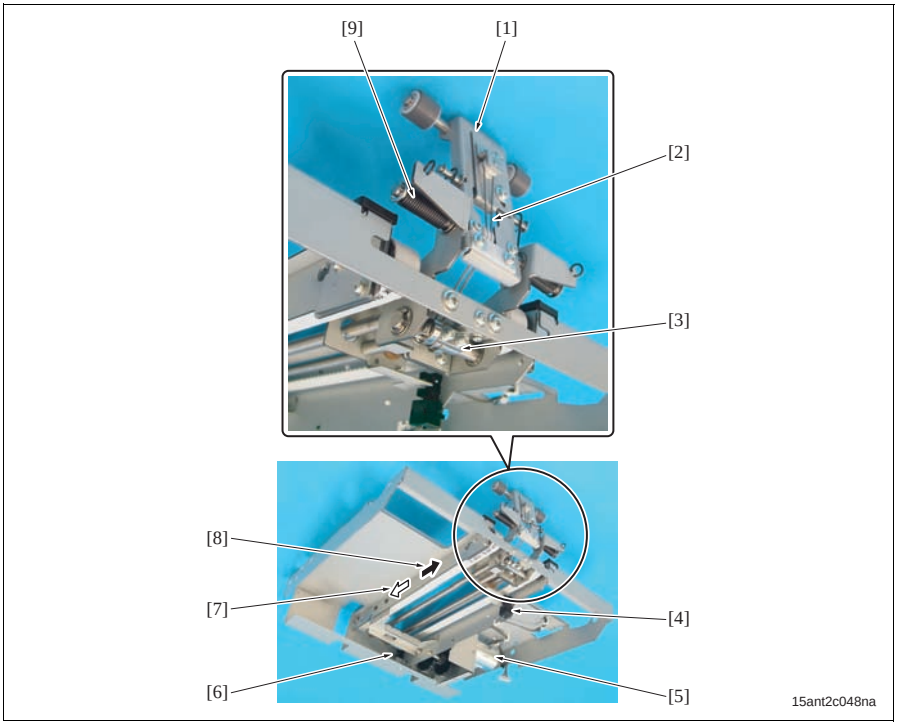
15ant2c047na

[1] Catching

[2] Conveying

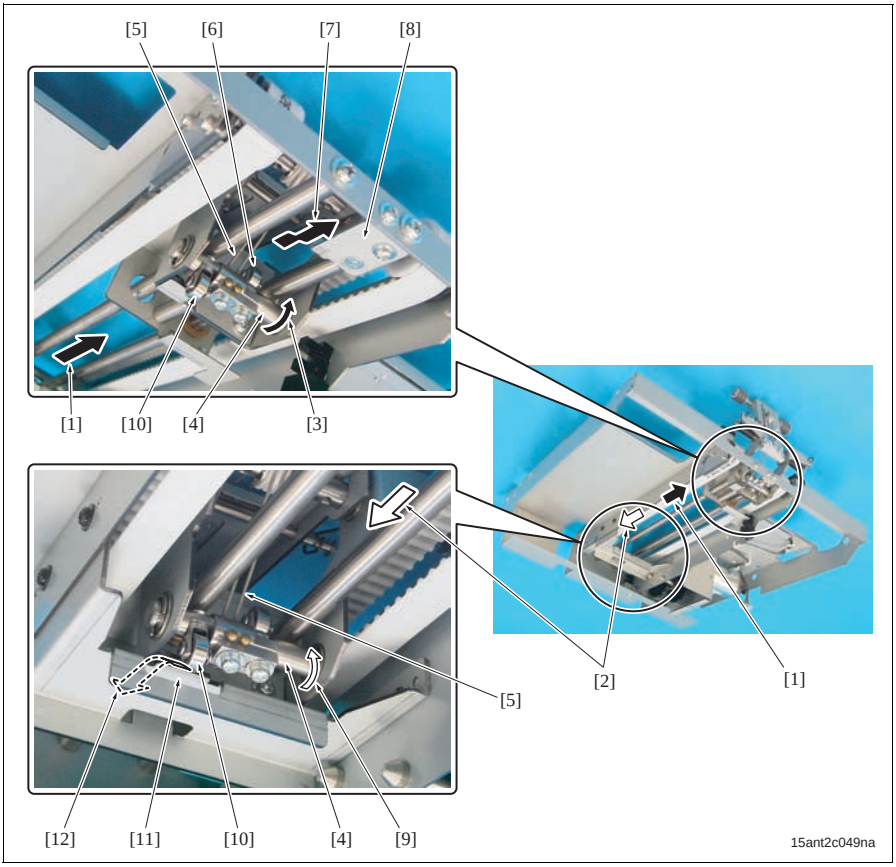
[3] Releasing

The bundle clip motor (M11) [5] drives the bundle clip [1] up [8] and down [7] via the gear and belt.
The spring [9] provides the bundle clip the force to catch the paper, and the wire [2] and the winding shaft [3] open the bundle clip to release the paper.
The upper limit of the bundle clip is detected by the bundle clip upper limit sensor (PS33) [4] and the lower limit is detected by the bundle clip lower limit sensor (PS30) [6].



[1] Bundle clip
[2] Wire
[3] Winding shaft
[4] Bundle clip upper limit sensor (PS33)
[5] Bundle clip motor (M11)
[6] Bundle clip lower limit sensor (PS30)
[7] Down
[8] Up
[9] Spring

The bundle clip is closed all the time except when it is located at the upper and lower limit position. When the bundle clip moves up [1], the release roller /Up [6] gets onto [7] the release plate /Up [8]. Then the wire winding shaft [4] rotates [3] and takes up the wire [5] to open the bundle clip.
In the same way, when the bundle clip moves down [2], the release roller /Lw [10] gets onto [12] the release plate /Lw [11] and then the wire winding shaft [4] rotates [9] and takes up the wire [5] to open the bundle clip.



[1] Up
[2] Down
[3] Wire winding rotation
[4] Wire winding shaft
[5] Wire
[6] Release roller /Up
[7] Getting over at up
[8] Release plate /Up
[9] Wire winding rotation
[10] Release roller /Lw
[11] Release plate /Lw
[12] Getting over at down

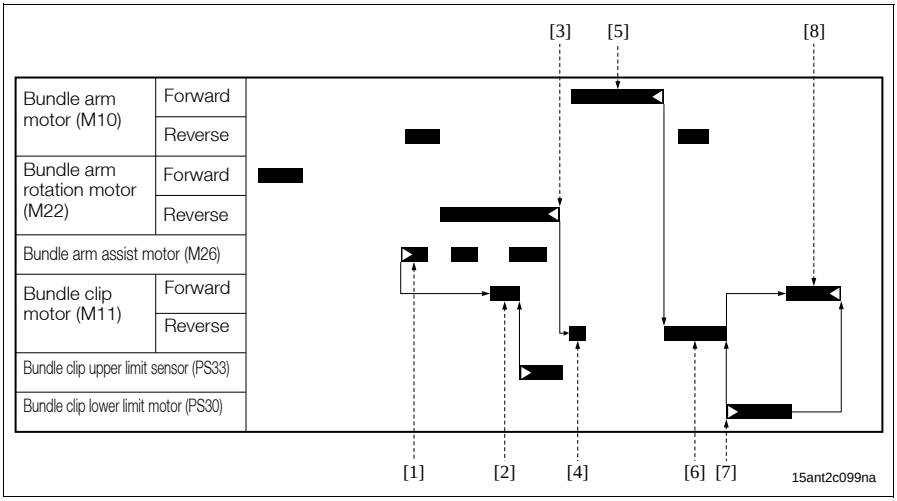
B. Control

The bundle clip motor (M11) rotates in the forward direction to move up the bundle clip until the bundle clip upper limit sensor (PS33) turns ON [2] after a specified period of time since the bundle assist motor (M26) starts the assisting operation [1]. Then, the bundle clip stops with its clip opened.

The bundle arm conveys the paper from the stapling section to the bundle clip section, and then the bundle arm rotation motor (M22) stops [3]. After a specified period of time, M11 rotates in the reverse direction to move down the bundle clip and close the bundle clip to catch the paper, and then M11 stops after a specified period of time [4]

When the bundle arm motor (M10) completes the shelter operation [5], M11 rotates in the reverse direction to move down the bundle clip [6]. The bundle clip opens the clip to release the paper [7] and M11 stops when the bundle clip lower limit sensor (PS30) turns ON.

M11 rotates in the forward direction to move up the bundle clip after a specified period of time since M11 stops. Then, M11 stops to move the bundle clip at the standby position for the subsequent set after a specified period of time since PS30 turns OFF [8].



[1] Assisting operation by the bundle arm

[2] Bundle clip opened

[3] Paper conveyance by the bundle arm completed

[4] Paper caught

[5] Bundle arm shelter operation

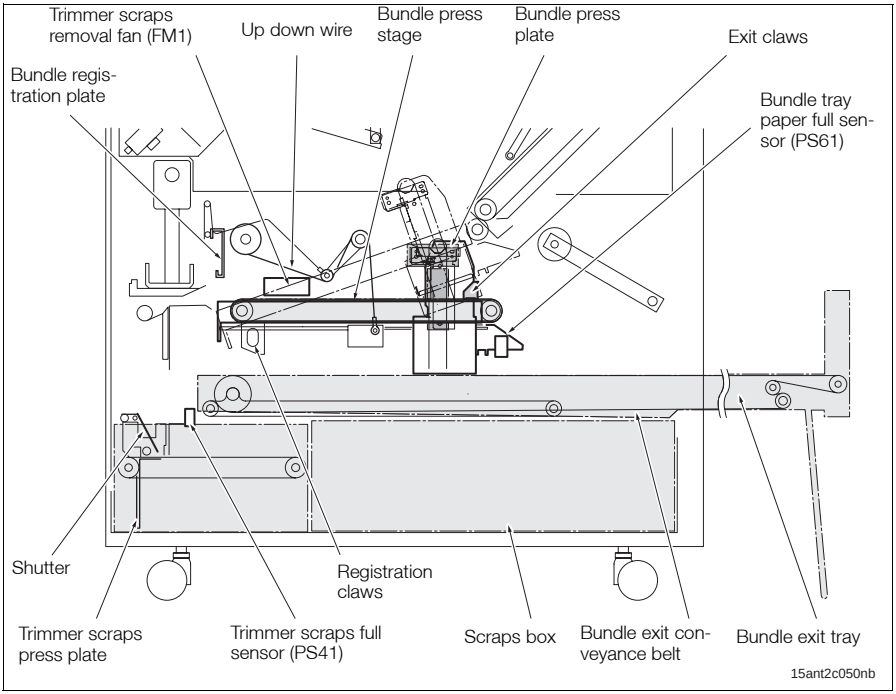
[6] Conveyed by the bundle clip

[7] Paper released

[8] Returned to the standby position for the subsequent set

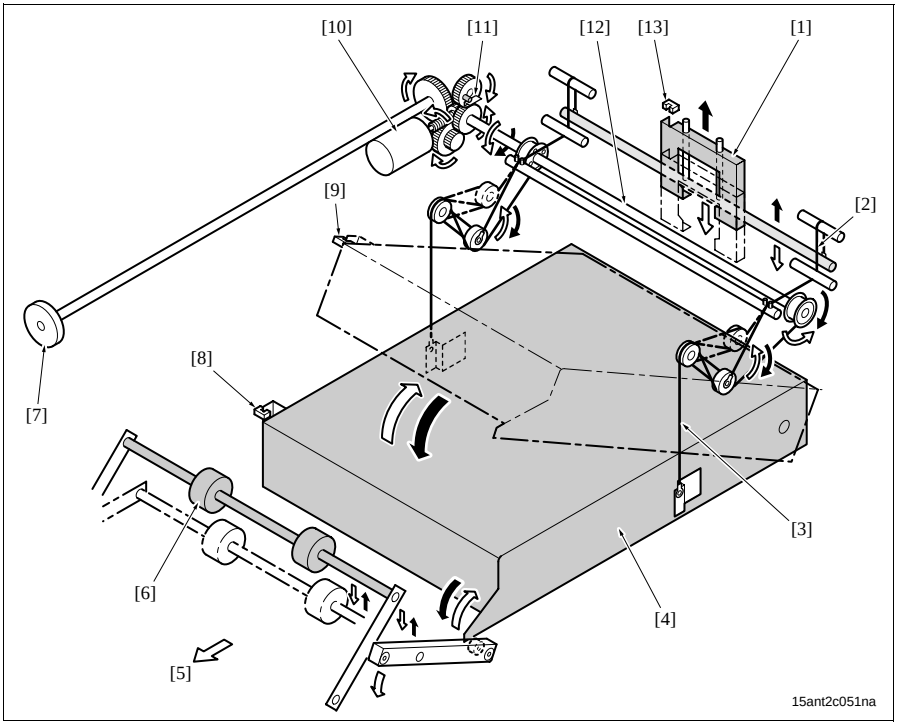
8. BUNDLE PROCESSING SECTION

⚠ 8.1 Composition



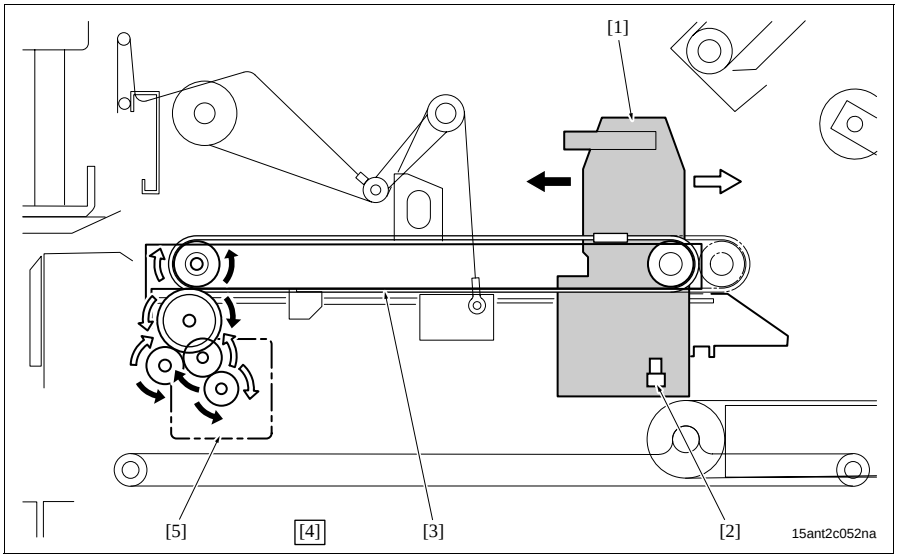
8.2 Drive

8.2.1 Bundle press stage lift drive



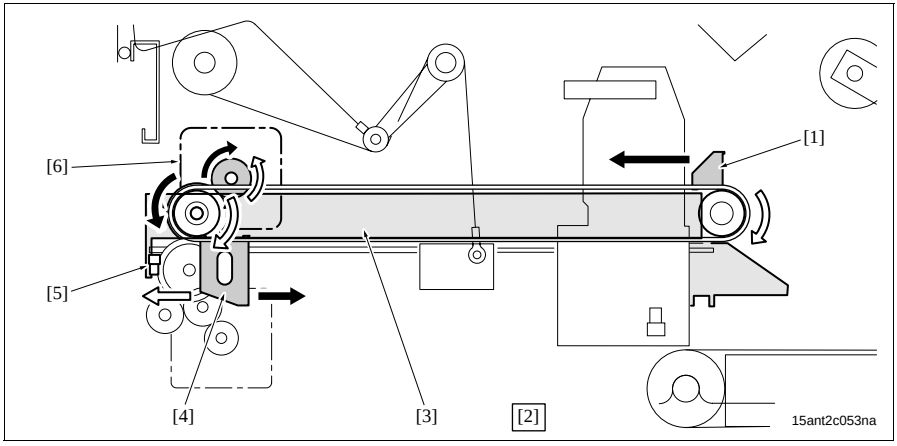
[1] Bundle registration plate
[2] Bundle registration plate wire
[3] Lift wire
[4] Bundle press stage
[5] Front side direction
[6] Bundle exit auxiliary roller
[7] Knob
[8] Bundle press stage up down home sensor (PS35)
[9] Bundle press stage up down limit sensor (PS45)
[10] Bundle press stage up down motor (M24)
[11] Over-winding-prevention stopper
[12] Wire winding shaft
[13] Bundle registration plate home sensor (PS16)

8.2.2 Bundle press movement drive



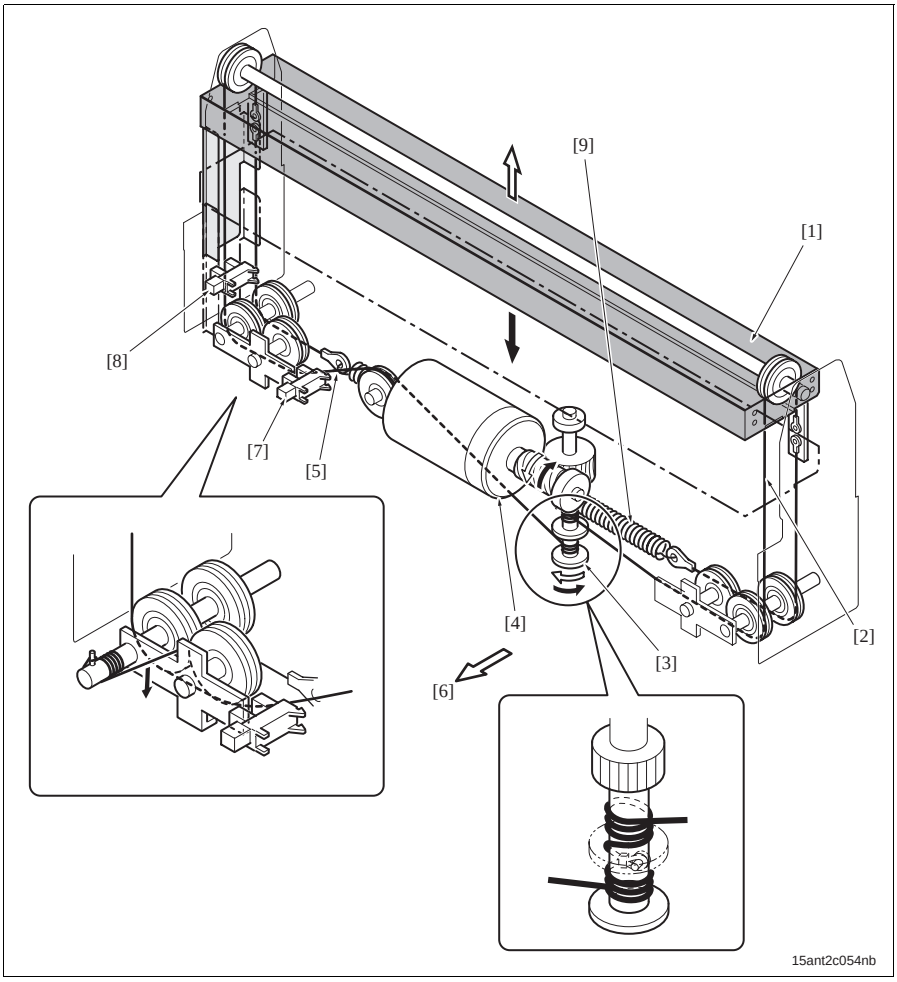
[1] Bundle press
[2] Bundle press movement home sensor (PS36)
[3] Bundle press stage
[4] Left side view
[5] Bundle press movement motor (M17)

8.2.3 Bundle registration drive



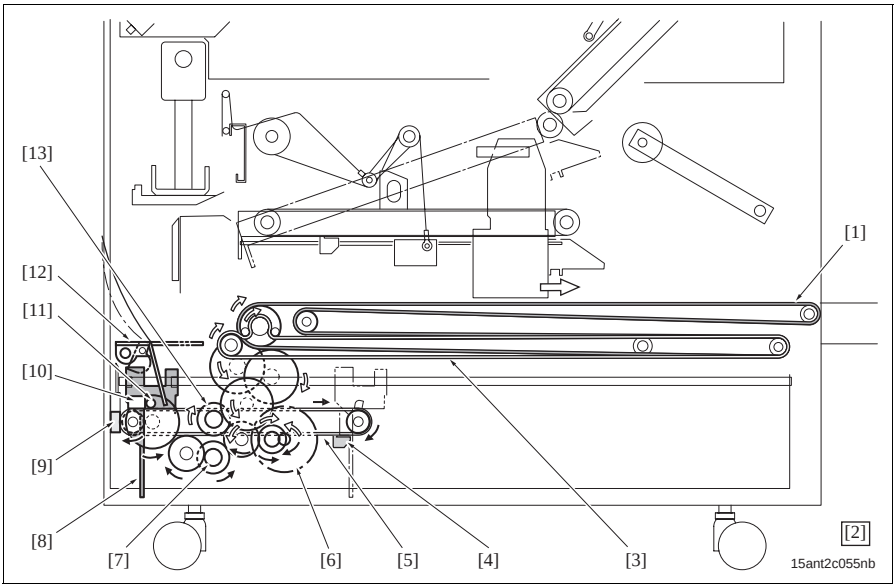
[1] Exit claws
[2] Left side view
[3] Bundle press stage
⚠ [4] Registration claws
[5] Bundle registration home sensor (PS34)
[6] Bundle registration motor (M12)

⚠ 8.2.4 Bundle press drive



[1] Bundle press plate /Up
[2] Release wire /Rt
[3] Wire winding shaft
[4] Bundle press motor (M23)
[5] Release wire /Lt
[6] Front side direction
[7] Bundle press lower limit sensor (PS47)
[8] Bundle press home sensor (PS37)
[9] Spring

⚠ 8.2.5 Bundle exit drive



[1] Bundle exit conveyance belt
[2] Left side view
[3] Bundle exit drive belt
[4] Actuator
[5] Belt
[6] Bundle exit motor (M5)
[7] One-way clutch (for the bundle exit conveyance belt)
[8] Trimmer scraps press plate
[9] Pin
[10] Trimmer scraps press claws
[11] Scraps press home sensor (PS48)
[12] Shutter
[13] One-way clutch (for pressing the trimmer scraps)

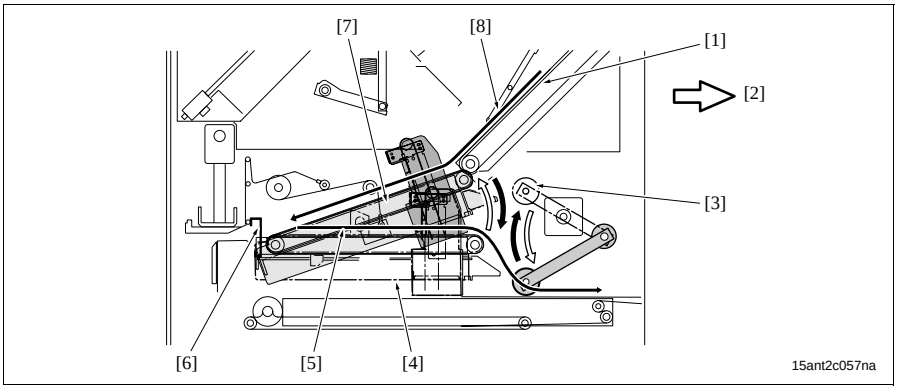
8.3 Operation

8.3.1 Bundle press stage up down control

The bundle press stage conducts the up and down operation to convey and exit the paper by the switch back method.

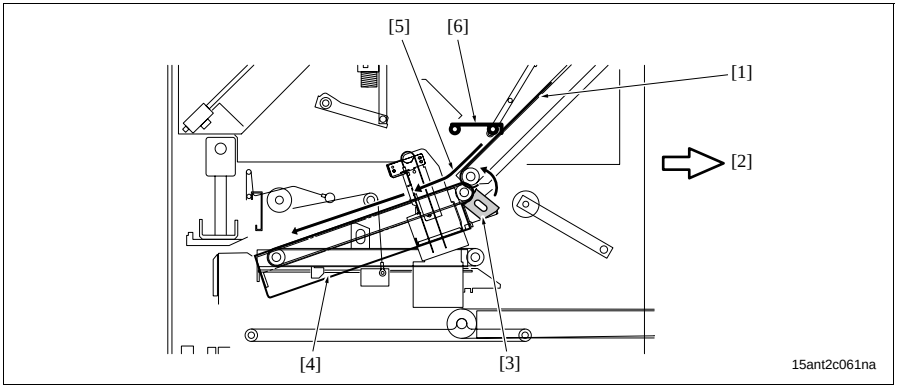
The bundle press stage is moved up [7] to decrease the angle difference when receiving the paper [8] conveyed by the bundle clip from the slope [1]. The bundle press stage exits the paper [5] to the bundle exit tray at the horizontal position [4] at the paper exit.

The bundle registration plate [6] and the bundle exit auxiliary roller [3] move up and down together with the up and down operation of the bundle press stage.



[1] Slope
[2] Front side direction
[3] Bundle exit auxiliary roller
[4] Bundle press stage (horizontal position)
[5] Paper path at the paper exit
[6] Bundle registration plate
[7] Bundle press stage (upper position)
[8] Paper path to the bundle press stage

The registration claws [3] push in the paper to make sure that the paper is conveyed to the bundle press stage when the bundle press stage [4] receives the paper from the bundle clip [6].



[1] Slope
[2] Front side direction
[3] Registration claws
[4] Bundle press stage
[5] Paper conveyance
[6] Bundle clip

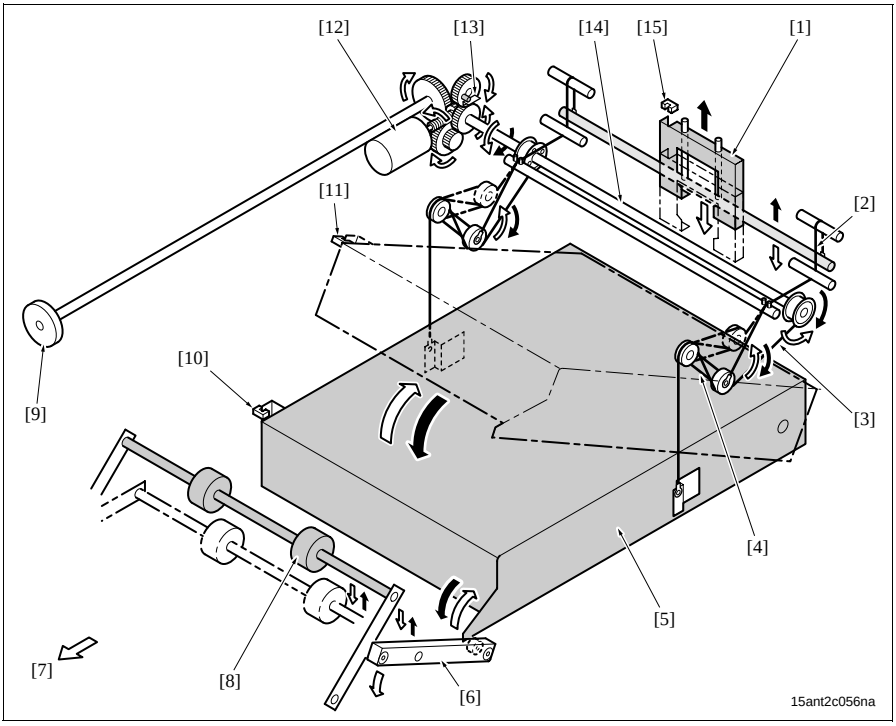
A. Mechanism

⚠1 The bundle press stage up down motor (M24) [12] rotates the wire winding shaft [14] and winds up the lift wire [3]. During the initial phase, the wire is tightened and the wire arm [4] comes to the horizontal position but the bundle press stage [5] doesn't move up. At the time, as the wire arm comes horizontal, the bundle registration plate wire [2] is loosen and the bundle registration plate [1] moves down and works as the stopper against the registration operation.

Then, the bundle press stage moves up as the wire winding shaft [14] rotates and winds up the up down wire [3] and it stops when the bundle press stage up down limit sensor (PS45) [11] turns ON.

The home positions (shelter position) for the bundle registration plate and the bundle press stage are detected by the bundle registration plate home sensor (PS16) [15] and the bundle press stage up down home sensor (PS35) [10] respectively.

The over-winding-prevention stopper [13] prevents the over winding since you can move up and down the bundle press stage manually by rotating the knob [9].



[1] Bundle registration plate
[2] Bundle registration plate wire
[3] Lift wire
[4] Wire arm
[5] Bundle press stage
[6] Bundle exit auxiliary roller arm
[7] Front side direction
[8] Bundle exit auxiliary roller
[9] Knob
[10] Bundle press stage up down home sensor (PS35)
[11] Bundle press stage up down limit sensor (PS45)
[12] Bundle press stage up down motor (M24)
[13] Over-winding-prevention stopper
[14] Wire winding shaft
[15] Bundle registration plate home sensor (PS16)

B. Control

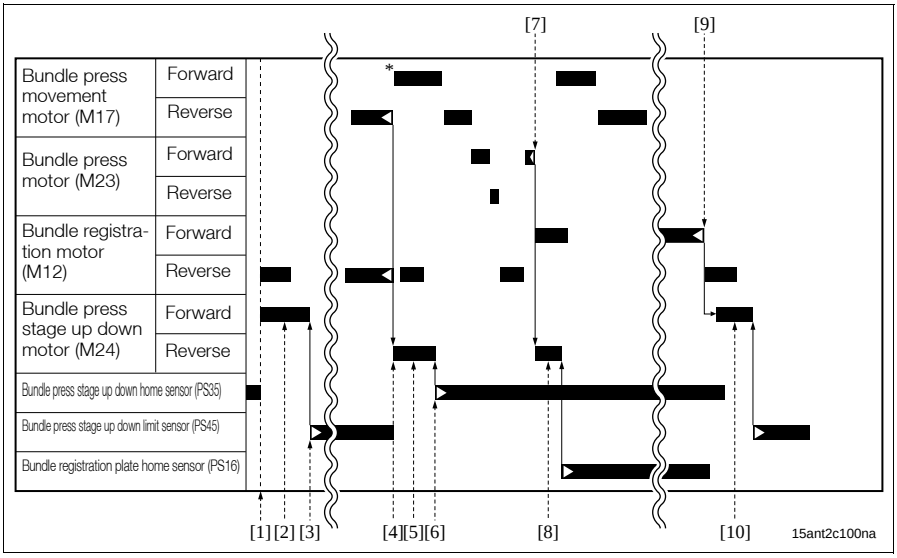
(1) Trimming mode

The bundle press stage up down motor (M24) rotates in the forward direction to move up the bundle press stage [2] when the main body start signal [1] turns ON. M24 stops while holding the bundle press stage in slanting position when the bundle press stage up down limit sensor (PS45) turns ON [3].

M24 rotates in the reverse direction to move down the bundle press stage [5] after the bundle clip releases the paper, the bundle registration motor (M12) assists the paper conveyance operation, and the bundle press movement motor (M17) conveys the paper to the paper conveyance position [4]. M24 stops when the bundle press stage up down home sensor (PS35) turns ON [6].

M24 starts to rotate in the forward direction and moves up the bundle registration plate [8] to open the paper path to the trimmer section when the bundle press motor (M23) completes the paper press operation after the registration operation.

M24 moves up the bundle press stage [10] for the subsequent set when M12 completes the paper exit [9].



[1] Main body start signal

[2] Bundle press stage moved up

[3] Stopped at the upper limit

[4] Paper conveyance assisting operation completed

[5] Bundle press stage moved down

[6] Returning to the home position

[7] Paper press completed

[8] Bundle registration plate moved up

[9] Paper exit completed

[10] Bundle press stage moved up

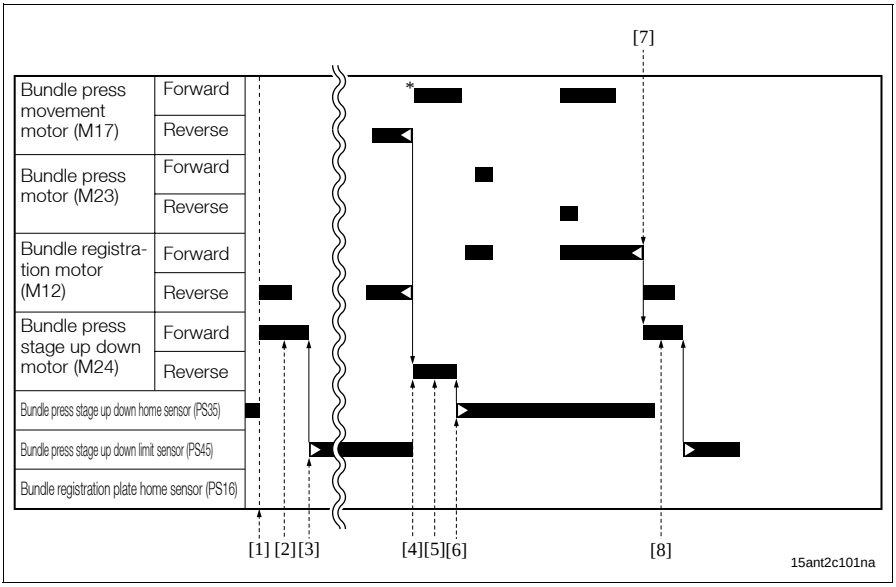
* Only for the paper of 297 mm or more (before folding)

(2) No trimming mode

The bundle press stage up down motor (M24) rotates in the forward direction to move up the bundle press stage [2] when the main body start signal [1] turns ON. M24 stops while holding the bundle press stage in slanting position when the bundle press stage up down limit sensor (PS45) turns ON [3].

M24 rotates in the reverse direction to move down the bundle press stage [5] after the bundle clip releases the paper, the bundle registration motor (M12) assists the paper conveyance operation, and the bundle press movement motor (M17) conveys the paper to the paper conveyance position [4]. M24 stops when the bundle press stage up down home sensor (PS35) turns ON [6].

M24 moves up the bundle press stage [8] for the subsequent set when M12 completes the paper exit [7].



[1] Main body start signal

[2] Bundle press stage moved up

[3] Stopped at the upper limit

[4] Paper conveyance assisting operation completed

[5] Bundle press stage moved down

[6] Returning to the home position

[7] Paper exit completed

[8] Bundle press stage moved up

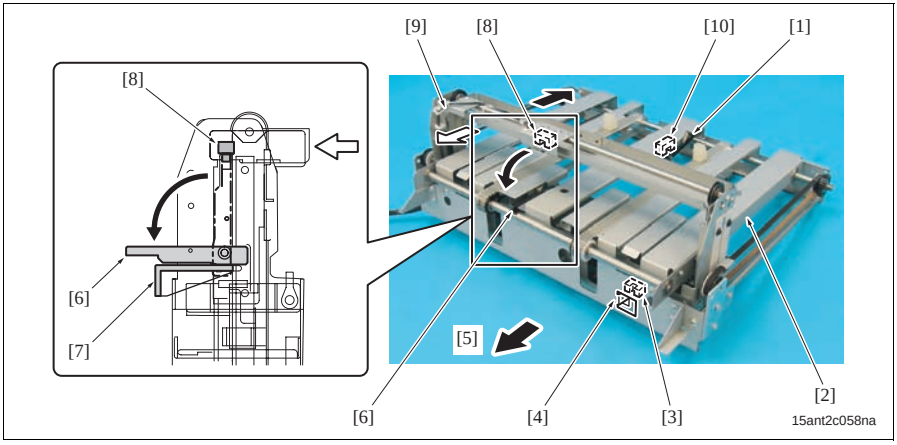
* Only for the paper of 297 mm or more (before folding)

8.3.2 Bundle press movement control

The bundle press movement is the mechanism to convey the paper to the trimmer section by pressing the paper with the press section to prevent the trimming skew at the trimmer operation after the paper registration operation.

A. Mechanism

The bundle press movement motor (M17) drives the bundle press section [9] in the main scan direction.
When receiving the paper with the bundle press stage [2], the bundle press section [9] moves 100 mm backward from the home position to obtain the paper conveyance path.
When conducting the bundle registration operation, the bundle press section moves to the appropriate position in accordance with the paper size.
The bundle press movement home sensor (PS36) [3] detects the home position of the bundle press section.
When the bundle press section moves to the home position, the metal plate [7] gets down the actuator [6] for the trimmer registration sensor (PS55) [8] and obtains the paper conveyance path.
The bundle sensor /4 (PS54) [10] is for the paper jam detection.



[1] Actuator
[2] Bundle press stage
[3] Bundle press movement home sensor (PS36)
[4] Actuator
[5] Front side direction
[6] Actuator
[7] Metal plate
[8] Trimmer registration sensor (PS55)
[9] Bundle press section
[10] Bundle sensor /4 (PS54)

B. Control

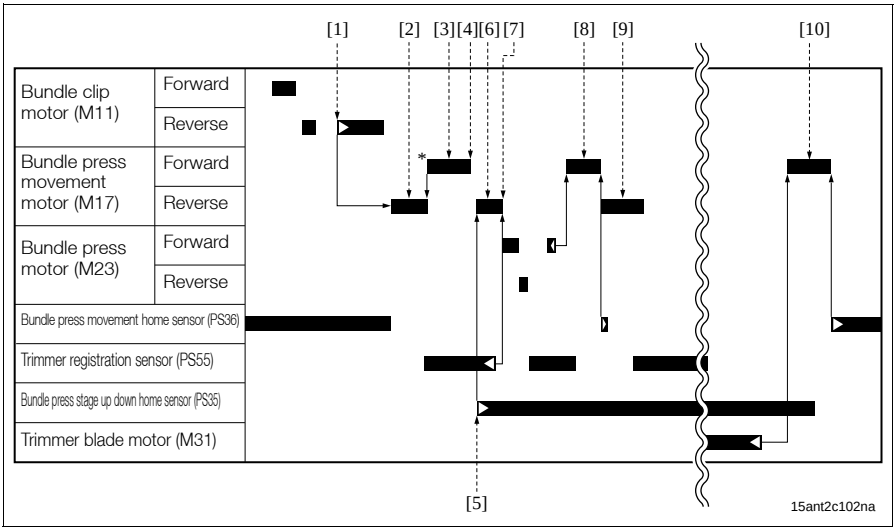
(1) Trimming mode

The bundle press movement motor (M17) rotates in the reverse direction to move the bundle press section to the paper conveyance position [2] after specified period of time since the bundle clip motor (M11) starts conveying the paper [1]. Then M17 rotates in the forward direction to move the bundle press section to the appropriate press standby position in accordance with the paper size [3].

M17 rotates in the reverse direction and searches for the press position [6] for the paper when the bundle press stage up down home sensor (PS35) detects that the bundle press stage has been moved down [5]. M17 stops the bundle press section at the appropriate position in accordance with the paper size [7] after a specified period of time since the trimmer registration sensor (PS55) turns OFF.

M17 searches the home position [8] and then moves the bundle press section to the paper trimming position [9] after a specified period of time since the bundle press motor (M23) completes the paper press operation.

The bundle press section is returned to the home position [10] after a specified period of time since the trimming operation is completed.



[1] Conveyed by the bundle clip

[2] Moved to the paper conveyance position

[3] Moved to the press standby position

[4] Home position detected

[5] Bundle press stage moved down

[6] Searching the press position

[7] Stopped at the press position

[8] Searching the home position

[9] Moved to the trimming position

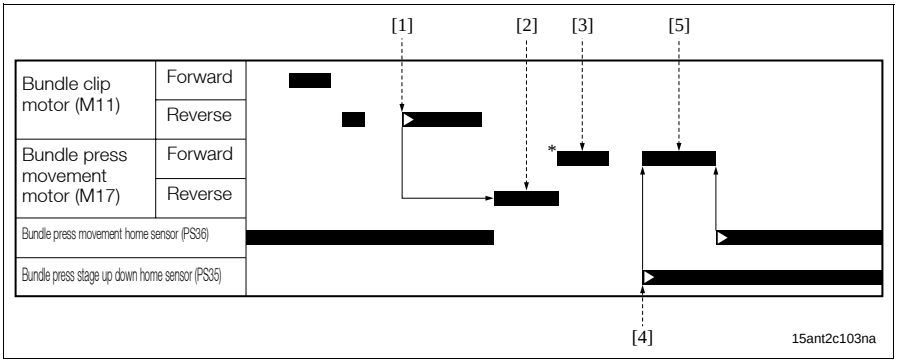
[10] Returning to the home position

* Only for the paper of 297 mm or more (before folding)

(2) No trimming mode

The bundle press movement motor (M17) rotates in the reverse direction to move the bundle press section to the paper conveyance position [2] after a specified period of time since the bundle clip motor (M11) starts conveying the paper [1]. Then M17 rotates in the forward direction to move the bundle press section to the appropriate press position in accordance with the paper size [3].

M17 rotates in the forward direction to return the bundle press section to the home position [5] when the bundle press stage up down home sensor (PS35) detects that the bundle press stage has been moved down [4].



[1] Conveyed by the bundle clip

[2] Moved to the shelter position

[3] Moved to the press position

[4] Bundle press stage up down home position

[5] Returning to the home position

* Only for the paper of 297 mm or more (before folding)

8.3.3 Bundle press control

The bundle press is the mechanism to hold the paper during trim operation to prevent the trimming skew after the paper registration operation.

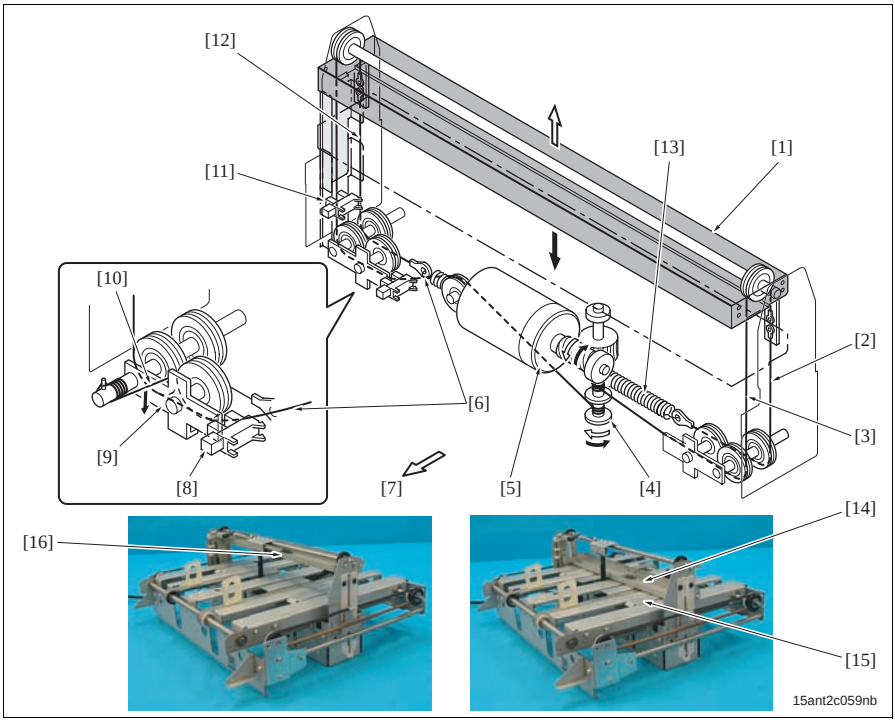
A. Mechanism

The bundle press plates /Up [1] and /Lw [15] hold the paper. The bundle press plate /Up is pulled to the bundle press plate /Lw [15] (to the direction to hold and press the paper) by the spring [13] via the press wires /Rt [2] and /Lt [12]. The bundle press plate /UP [1] moves down by the spring [13] when the wire winding shaft [4] is rotated by the bundle press motor (M23) [5] and the release wires /Rt [3] and /Lt [6] are released. The force of the spring presses the paper.

When M23 keeps rotating, the press wire /Lt [6] is loosen and the bundle press lower limit sensor (PS47) [8] turns OFF by the actuator [9] due to the spring [10], and then the paper press position is detected.

The wire winding shaft [4] winds the release wires /Rt [3] and /Lt [6] to move up the bundle press plate /Up [1] for releasing the press on the paper [16] when M23 rotates in reverse.

The bundle press home sensor (PS37) [11] detects the home position of the bundle press plate /Up [1].



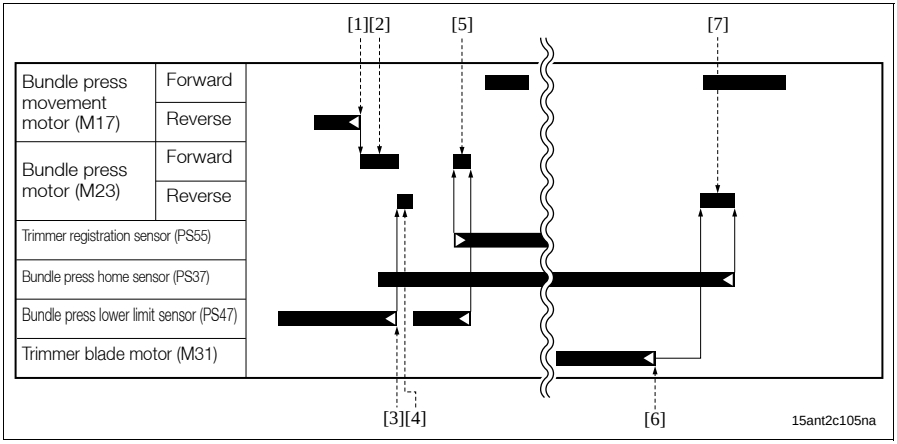
[1]	Bundle press plate /Up	[9]	Actuator
[2]	Press wire /Rt	[10]	Spring
[3]	Release wire /Rt	[11]	Bundle press home sensor (PS37)
[4]	Wire winding shaft	[12]	Press wire /Lt
[5]	Bundle press motor (M23)	[13]	Spring
[6]	Release wire /Lt	[14]	Bundle press plate /Up (down)
[7]	Front side direction	[15]	Bundle press plate /Lw
[8]	Bundle press lower limit sensor (PS47)	[16]	Bundle press plate /Up (up)

B. Control

The bundle press motor (M23) rotates in the forward direction to conduct the paper press operation [2] to press the paper properly when the bundle press movement motor (M17) completes the press position search [1]. M23 rotates in the reverse direction to move up the bundle press plate /Up slightly to prevent the paper from becoming loose [4] when the bundle press lower limit sensor (PS47) detects the lower limit [3] and turns OFF.

M23 rotates in the forward direction to press the paper [5] after a specified period of time since the trimmer registration sensor (PS55) detects the completion of the registration operation.

M23 rotates in the reverse direction to return the bundle press plate /Up to the home position [7] when the trimmer blade motor (M31) completes the paper trimming operation [6].



[1] Searching the press position completed
[2] Press operation
[3] Lower limit detected
[4] Press release
[5] Press
[6] Trimming completed
[7] Returning to the home position

8.3.4 Bundle registration control

The paper registration operation reforms the skew at trimming.

A. Mechanism

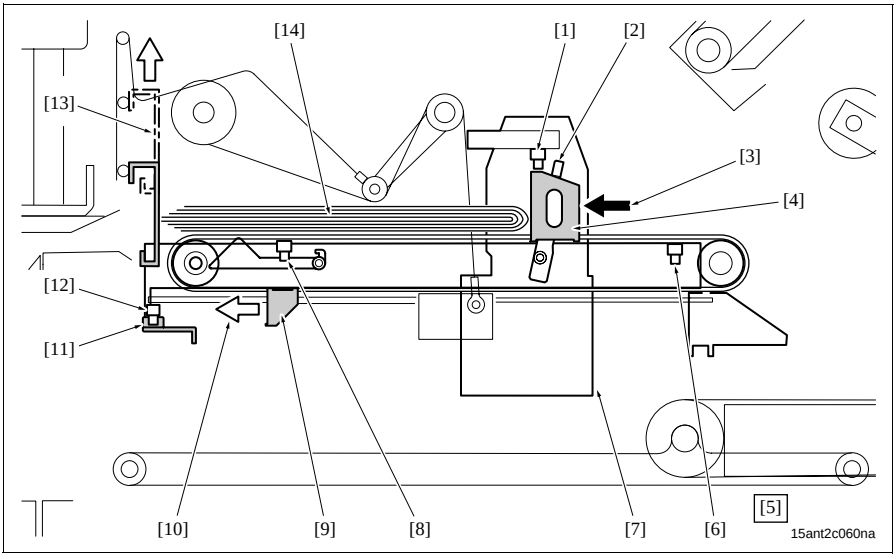
The bundle registration motor (M12) drives the registration claws [4].

Two registration claws [4] conduct the registration by making the paper [14] contact [3] with the bundle registration plate [13] from the gutter side.

In the registration operation, the bundle press section [7] conducts the pressing by moving to the appropriate position in accordance with the paper size. To conduct the bundle registration, the registration claws [4] press the paper until the actuator [2] on the bundle press section comes in the upright position and the trimmer registration sensor (PS55) [1] turns ON.

The bundle exit claws [9] are located at the 180° opposite to the registration claws on the belt. M12 rotates in the reverse direction [10] to exit the paper at the paper exit.

The home position of the registration claws [4] is detected when the registration claws push the actuator [11] and turns ON the bundle registration home sensor (PS34) [12].



[1] Trimmer registration sensor (PS55)
[2] Actuator
[3] Registration direction
[4] Registration claws
[5] Left side view
[6] Bundle sensor /2 (PS15)
[7] Bundle press section
[8] Bundle sensor /4 (PS54)
[9] Bundle exit claws
[10] Drive direction of the bundle exit tabs
[11] Actuator
[12] Bundle registration home sensor (PS34)
[13] Bundle registration plate
[14] Paper

B. Control

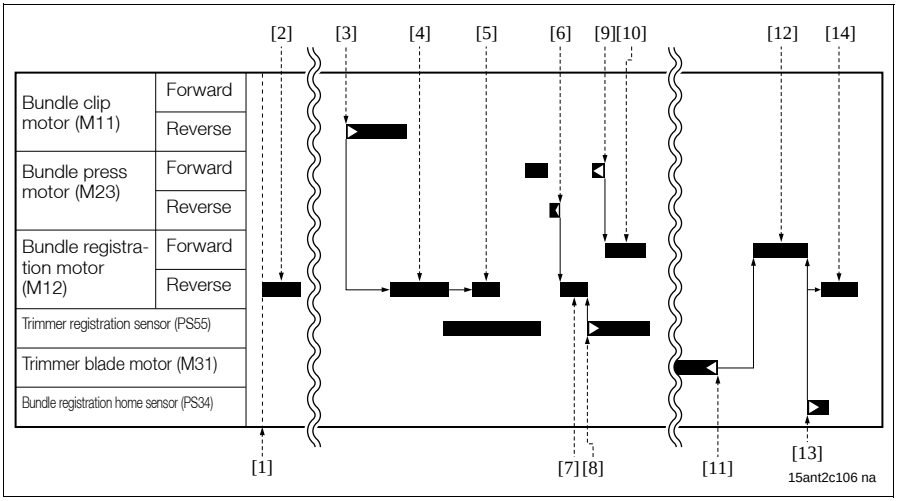
The bundle registration motor (M12) rotates in the reverse direction when the main body start signal turns ON and the registration claws move to the standby position in accordance with the paper size [2].

The bundle registration motor (M12) rotates in the reverse direction to conduct the paper conveyance assisting operation [4] and the preregistration operation [5] after a specified period of time since the bundle clip motor (M11) starts conveying the paper [3]. Then M12 stops when the registration claws reach at the specified position.

M12 rotates in the reverse direction and conducts the registration operation [7] with the registration claws when the bundle press motor (M23) completes the press releasing operation [6]. The registration claws stop when the trimmer registration sensor (PS55) turns ON [8].

M12 rotates in the forward direction to move the registration claws to the specified shelter position [10] when M23 completes the press operation [9].

M12 rotates in the forward direction to let the bundle exit claws push the paper to conduct the paper exit operation [12] after a specified period of time since the trimmer blade motor (M31) completes the trimming operation [11]. M12 stops when the bundle registration home sensor (PS34) turns ON [13]. M12 rotates in the reverse direction to move the bundle exit claws to the standby position [14] after a specified period of time. Then it stands by for the subsequent set.



[1] Main body start signal
[2] Moved to the standby position
[3] Conveyance by the bundle clip started
[4] Paper conveyance assisted
[5] Pre-registration
[6] Press release
[7] Registration
[8] Registration operation completed
[9] Paper press completed
[10] Shelter operation
[11] Trimming completed
[12] Paper exit operation
[13] Home position detected
[14] Moved to the standby position

8.3.5 Bundle exit control

A. Mechanism

(1) Bundle exit mechanism

The paper is exited to the bundle exit tray [12].

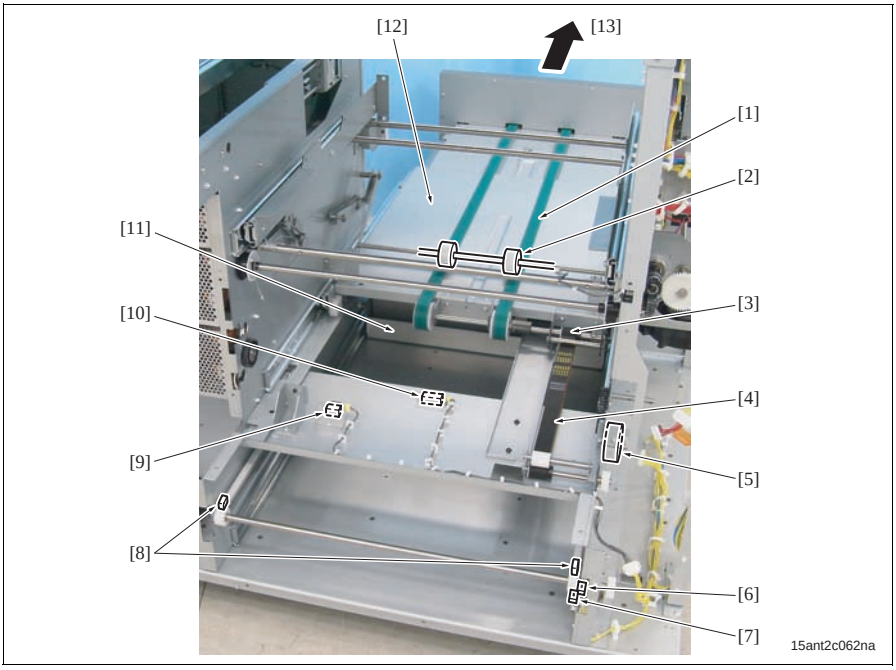
The paper exited to the bundle exit tray is conveyed to the front by the bundle exit conveyance belt [1] and stacked.

The bundle exit motor (M5) [5] drives the bundle exit conveyance belt [1] via the bundle exit drive belt [4] and the bundle exit belt drive shaft [3].

M5 drives the bundle exit conveyance belt for a specified period of time to convey the paper to the front [13] for every paper exit.

The bundle exit tray is expandable. The bundle tray set sensor (PS58) [9] detects whether the bundle exit tray is stored or not.

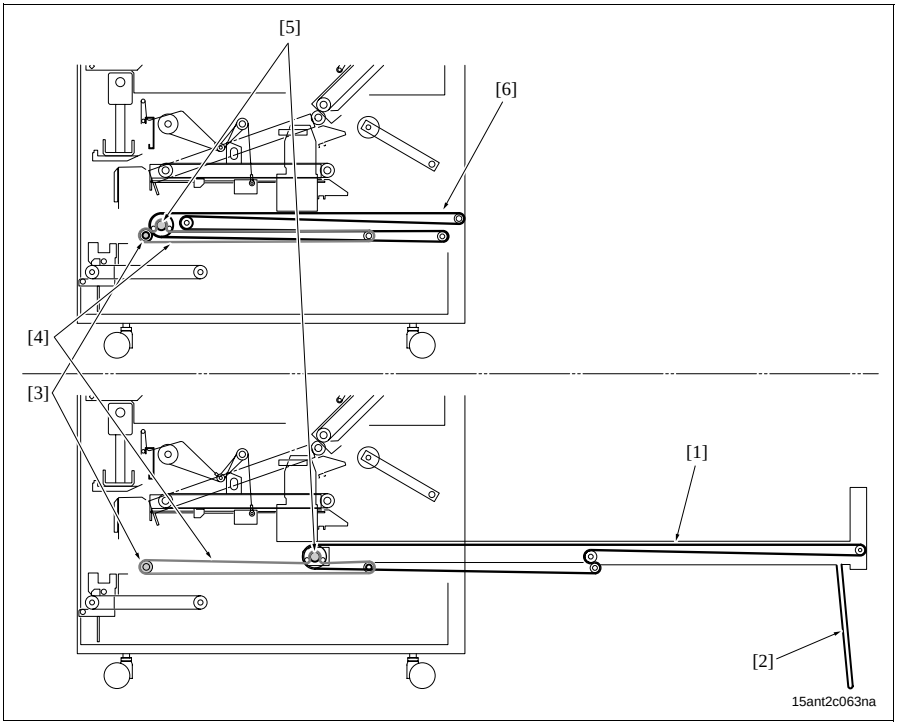
M5 also drives the scrap press plate [11]. In each drive path from M5 to the bundle exit drive belt and the scraps press plate, there is a one-way clutch respectively that switches the rotational direction of M5. Therefore, the bundle exit drive and the scraps press plate are not driven simultaneously.



[1] Bundle exit conveyance belt
[2] Bundle exit auxiliary roller
[3] Bundle exit belt drive shaft
[4] Bundle exit drive belt
[5] Bundle exit motor (M5)
[6] Scraps press home sensor (PS48)
[7] Scraps box set sensor (PS40)
[8] Scrap press claws
[9] Bundle tray set sensor (PS58)
[10] Trimmer scraps full sensor (PS41)
[11] Scraps press plate
[12] Bundle exit tray
[13] Front side direction

(2) Bundle exit tray expanding mechanism

The bundle exit tray is expandable. The folded bundle exit conveyance belt [6] is also expanded [1] when the bundle exit tray is expanded. At the time, it also moves the bundle exit conveyance belt drive shaft [5] for the bundle exit conveyance belt [1] and [6].



[1] Bundle exit conveyance belt (expanded)
[2] Folding stand
[3] Drive shaft
[4] Bundle exit drive belt
[5] Bundle exit conveyance belt drive shaft
[6] Bundle exit conveyance belt (folded)

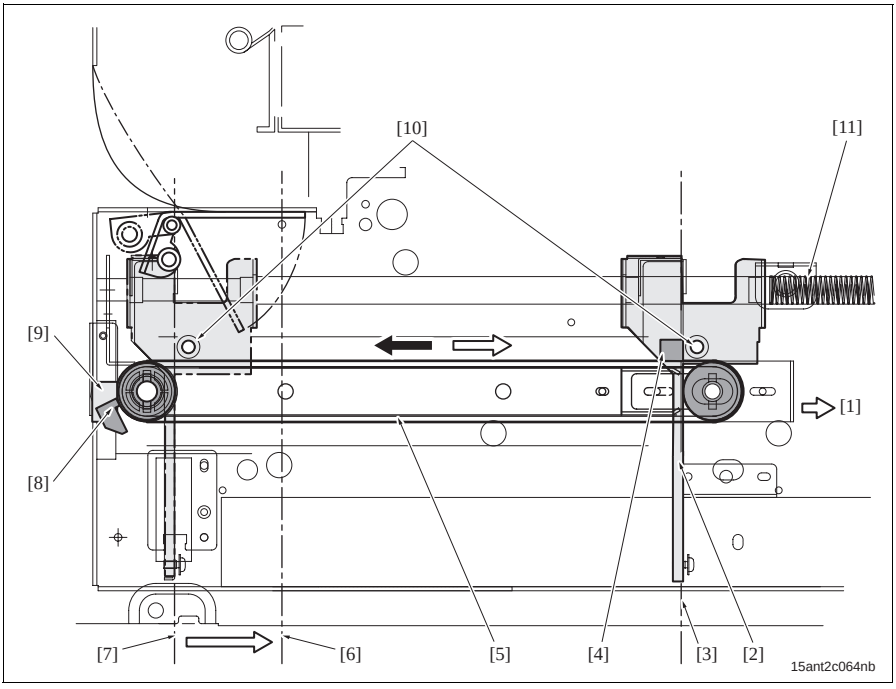
(3) Trimmer scraps press mechanism

Trimmer scraps press is executed by driving the bundle exit motor (M5). The M5 motor drives the pins [10] via the scraps press craws [4] on the belt [5] to move the scraps press plate [2] forward, then the trimmer scraps are pressed by the plate. The spring [11] pushes the scraps press plate to put it back.

The trimmer scraps press is carried out when the actuator [8] turns on the scraps press home sensor (PS48) [9] with the press position of the scraps press plate is at the home position

The maximum travel distance of the scraps press plate is 200 mm.

The trimmer scraps press is carried out when the trim is performed five times or when the total trimmed number of sheets becomes 60 sheets (30 sheets before folding) or more.



[1] Front side direction
[2] Scraps press plate (maximum movement position)
[3] Home position
[4] Scrap press claws
[5] Belt
[6] Trimming position
[7] Backmost position
[8] Actuator
[9] Scraps press home sensor (PS48)
[10] Pin
[11] Spring

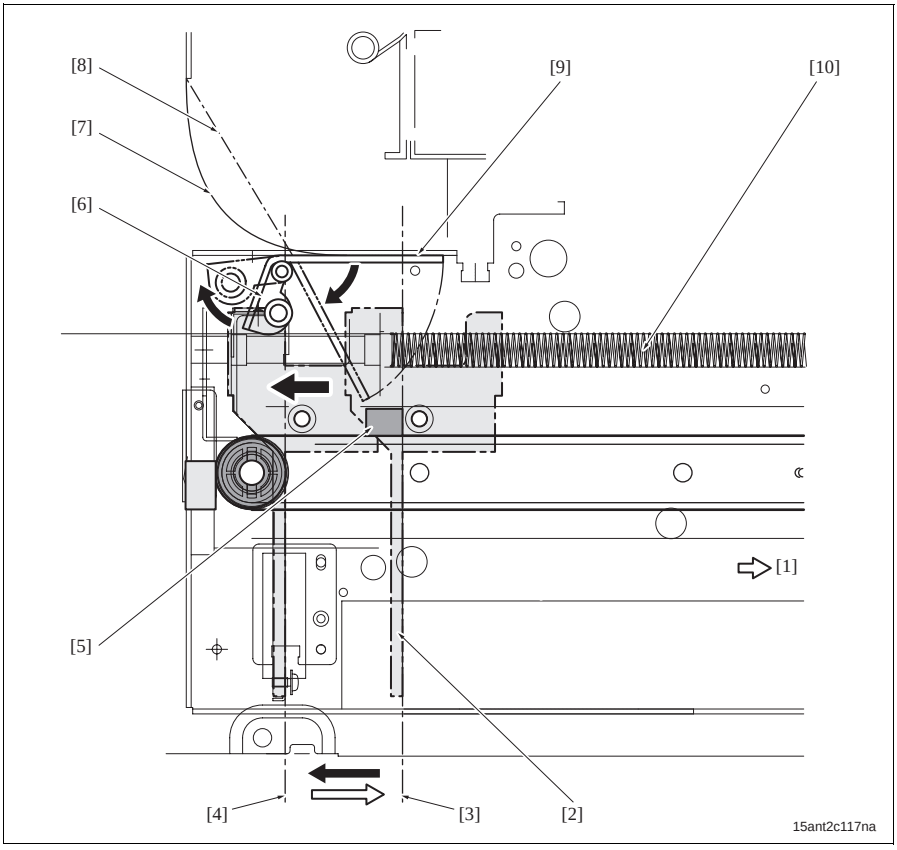
⚠ **(4) Shutter mechanism**

When the spring [10] pushes the scraps press plate [2] to its backmost position, the shutter arm [6] is pushed up and the shutter [9] is opened. On the other hand, the shutter is closed when the scraps press plate is moved forward from the back most position to the position [3] by the spring of the shutter arm.

Opening the shutter allows the guide sheet [7], which is attached to the shutter, to be straightened [8] due to the tension. Closing the shutter allows slack in the guide sheet to widen the dropping path of scraps.

Before trimming, the scraps press plate moves 50 mm [3] from the backmost position and stops to be ready for trimming.

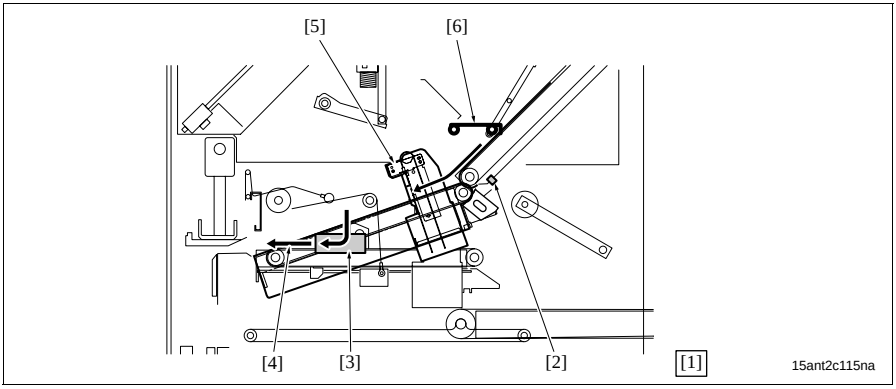
The shutter repeats opening/closing operation by shuttling the scraps press plate 50mm back and forth in each trimming operation. This shutter operation creates vibration with the guide sheet to shake off the trimmer scraps.



[1] Front side direction
[2] Scraps press plate
[3] Shutter closing position
[4] Shutter opening position
[5] Scraps press claws
[6] Shutter arm
[7] Guide sheet
[8] Guide sheet (straightened)
[9] Shutter
[10] Spring

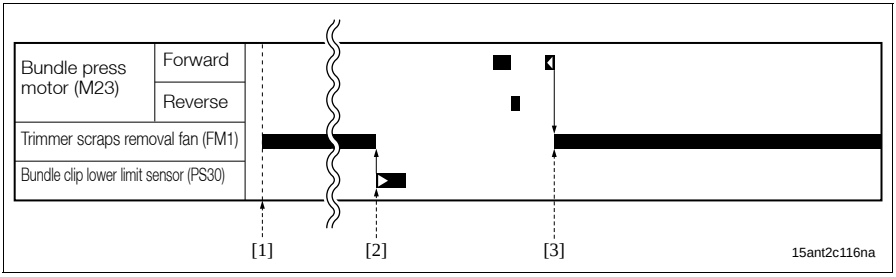
B. Trimmer scraps removal control

The scraps removal fan (FM1) [3] blows air [4] to make sure to put the trimmer scraps to the scraps box.



[1] Left side view
[2] Bundle clip lower limit sensor (PS30)
[3] Trimmer scraps removal fan (FM1)
[4] Air
[5] Bundle press
[6] Bundle clip

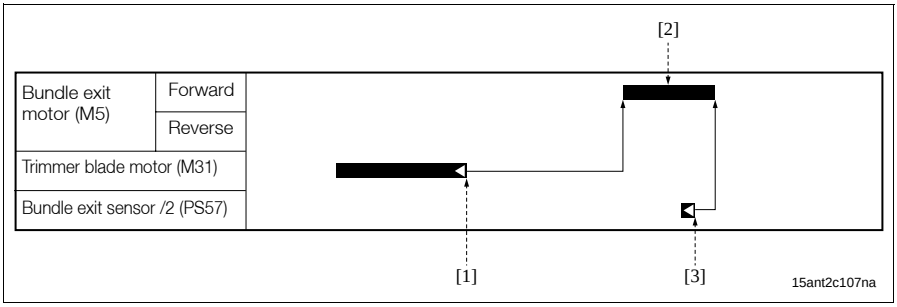
The trimmer scraps removal fan (FM1) operates only in the trimmer mode.
When the main body start signal [1] turns ON, FM1 is rotated and the bundle clip releases [2] the paper, FM1 stops for a time to prevent the paper from having the uneven edge. When the bundle press motor (M23) completes the paper press [3], FM1 is rotated again to send air so that sheet trimming scraps get in the scraps box without fail.



[1] Main body start signal
[2] Bundle clip released the paper
[3] Paper press operation completed

C. Bundle exit control

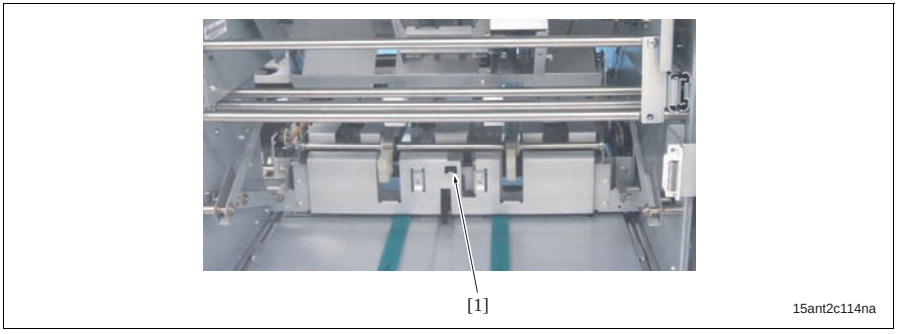
The bundle exit motor (M5) rotates in the forward direction and the bundle exit conveyance belt conveys the exit paper [2] after a specified period of time since the trimmer blade motor (M31) completes the trimming [1]. M5 stops after a specified period of time since the bundle exit sensor /2 (PS57) detects the trailing edge of paper[3].



[1] Trimming completed

[2] Bundle exit conveyance

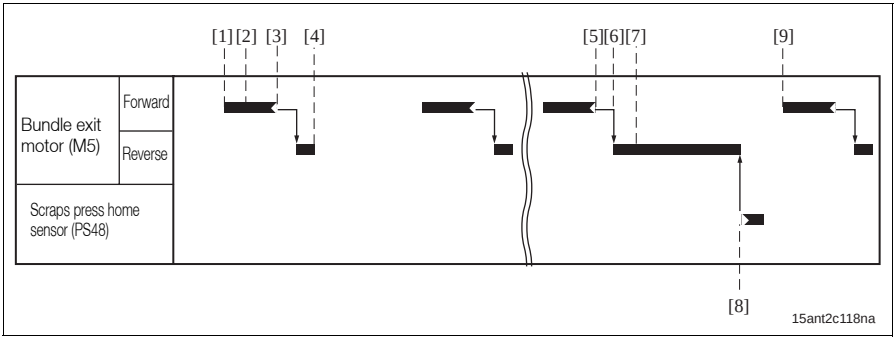
[3] Trailing edge of paper detected



[1] Bundle exit sensor /2 (PS57)

D. Shutter / trimmer scraps press control

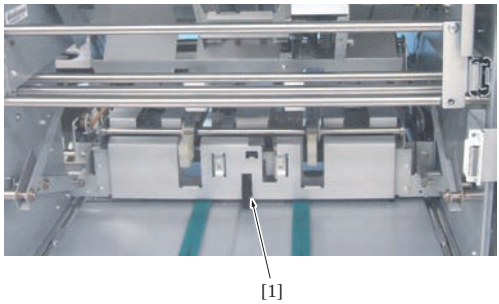
When the trimming is executed with the shutter closed, the bundle exit motor (M5) starts rotating forward to exit paper [1]. Then the scraps press plate moves backward to drop the trimmer scraps with the shutter opened [2]. After a specified period of time since the paper exit is finished [3], the M5 motor rotates in reverse to move the scraps press plate frontward 50 mm and stops [4] with the shutter closed. Then the next trimming is excused in this condition. After a specified period of time from paper exit when the trimming is performed five times or when the total trimmed number of sheets becomes 60 sheets (30 sheets before folding) or more after the previous scraps press operation, the M5 motor starts rotating in reverse to start the press operation. When the press operation is started, the shutter opened by the paper exit operation is closed again [7]. When the scraps press home sensor (PS48) detects that the scraps press plate is at the home position, the M5 motor stops [8] and next operation of the trimming and paper exit [9] is performed.



[1] Start of paper exit
[2] Shutter is opened
[3] Paper exit completed
[4] Shutter is closed
[5] Finish of paper ejection
[6] Start of press operation
[7] Shutter is closed
[8] Press position stop
[9] Start of paper exit

E. Bundle exit paper full control

The bundle tray paper full sensor (PS61) [1] detects the bundle exit paper full. The main body displays the message on its operation panel when the paper full is detected.



[1] Bundle tray paper full sensor (PS61)

⚠ **F. Trimmer scraps full control**

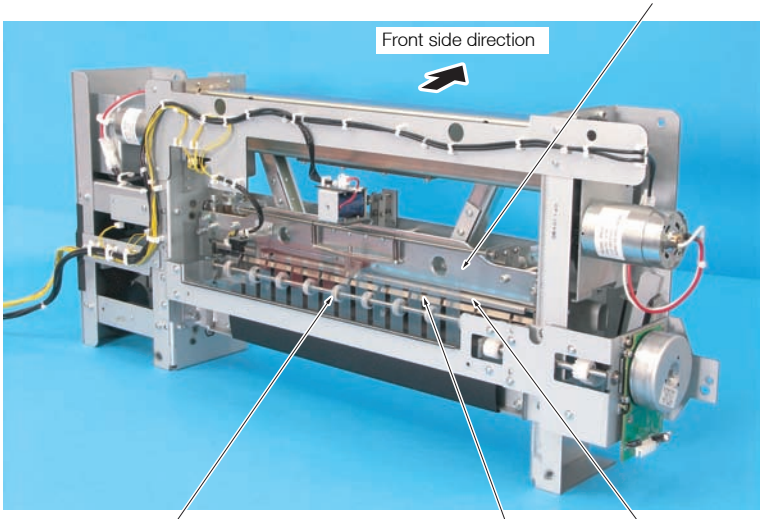
The trimmer scraps full sensor (PS41) detects the paper scraps full of the scraps box. When the PS 41 is turned on for three seconds after the paper exit operation driven by the (M5) is finished, the scraps is detected as full. The main body displays the message on its operation panel when the paper scraps full is detected.

G. Trimmer scraps tray set detection

The scraps box set sensor (PS40) detects whether the scraps box is set or not. The main body displays the message on its operation panel when the scraps box is not set.

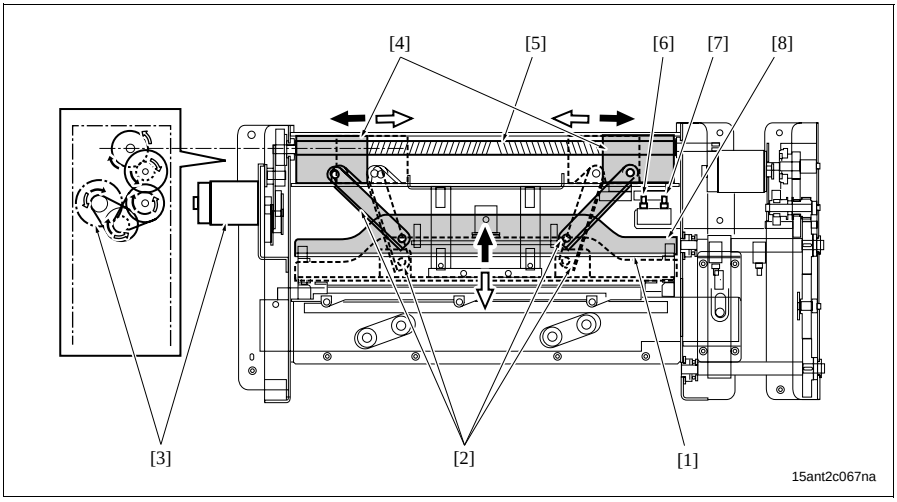
9. TRIMMER SECTION

⚠ 9.1 Composition



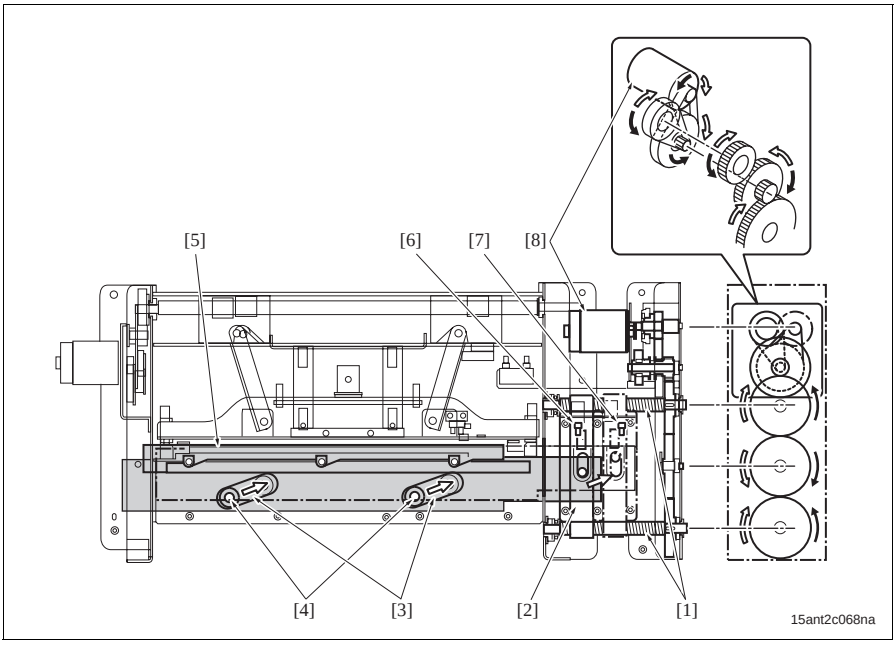
9.2 Drive

9.2.1 Trimmer press drive



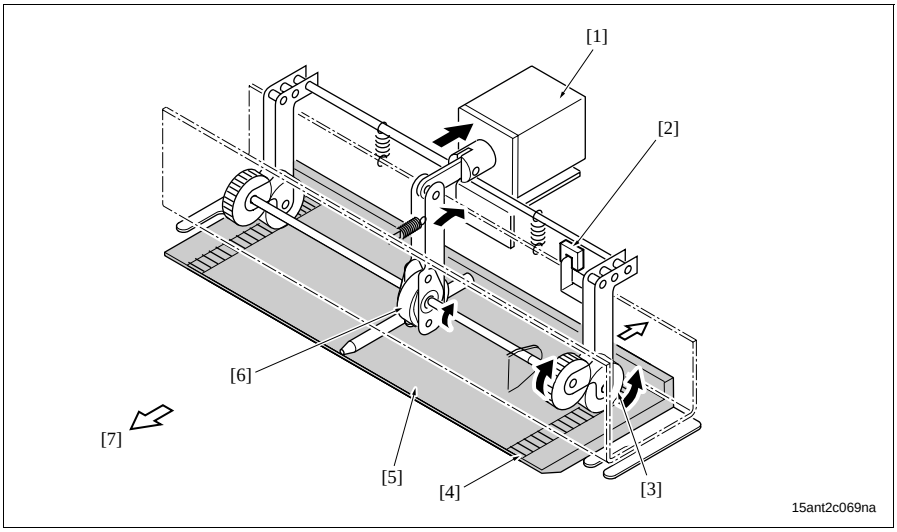
[1] Trimmer board
[2] Press arm
[3] Trimmer press motor (M32)
[4] Slide block
[5] Press drive screw
[6] Trimmer press home sensor (PS53)
[7] Trimmer press upper limit sensor (PS52)
[8] Trimmer press plate

9.2.2 Trimmer blade drive



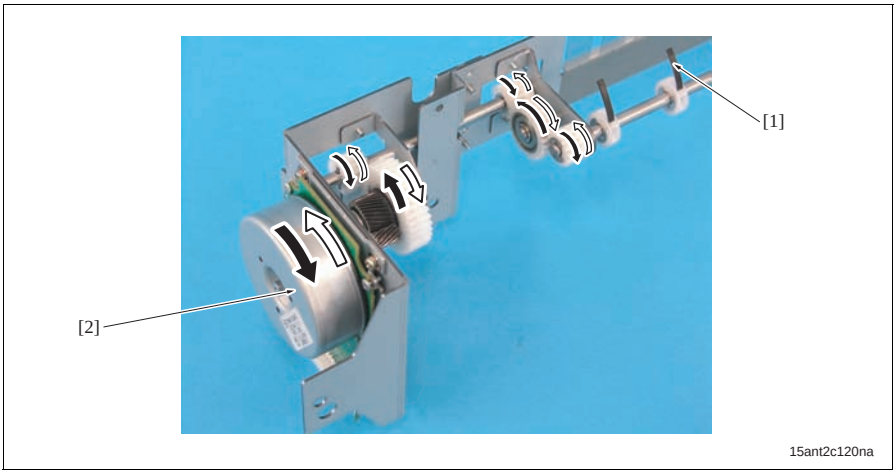
[1] Trimmer blade drive screw
[2] Drive plate
[3] Drive guide holes
[4] Drive shafts
[5] Trimmer blade
[6] Trimmer blade home sensor (PS50)
[7] Trimmer blade upper limit sensor (PS51)
[8] Trimmer blade motor (M31)

9.2.3 Trimmer board drive



[1] Trimmer board solenoid (SD11)
[2] Trimmer board replacement sensor (PS59)
[3] Pinion
[4] Rack
[5] Trimmer board
[6] One-way clutch
[7] Front side direction

⚠ 9.2.4 Paddle drive



[1] Trimmer paddle

[2] Trimmer paddle motor (M33)

9.3 Operation

9.3.1 Trimmer press control

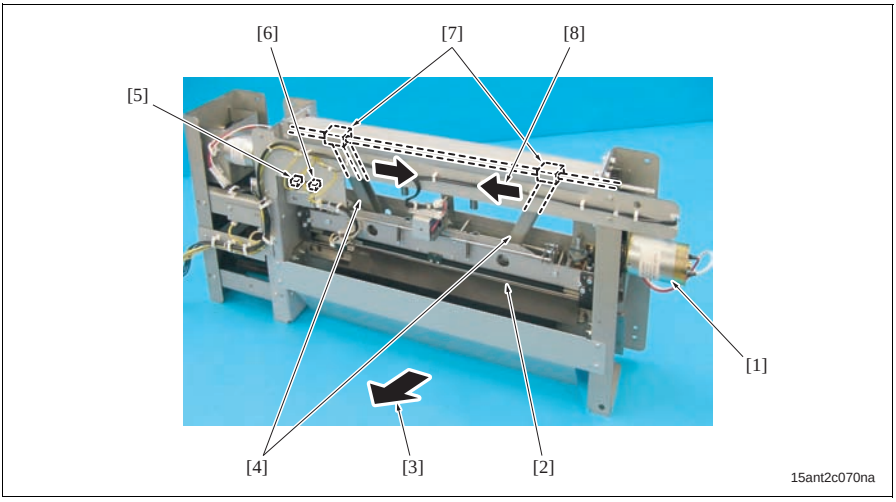
A. Mechanism

The trimmer press is the mechanism to hold the paper at its fore-edge side to prevent the trimming misalignment.

There is approximately 5 mm of opening at the home position. The press arms [4] press the paper with the trimmer board [2] when the trimmer press motor (M32) [1] drives and the slide blocks [7] move to the closing direction [8]. M32 detects the completion of the paper press via overcurrent.

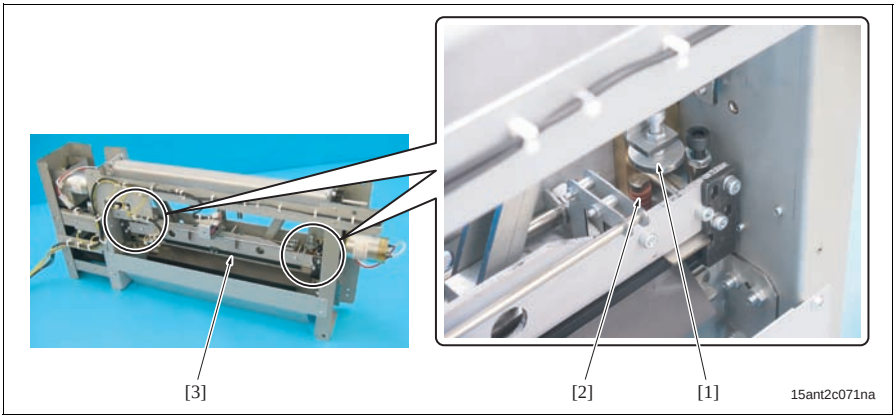
M32 rotates in the reverse direction to widen the opening to approximately 20 mm before conveying the paper to the trimmer section if the number of the print paper is 16 or more (32 or more for the saddle stitched paper).

The trimmer press home sensor (PS53) [6] and the trimmer press home sensor (PS52) [5] detect the home position and 20 mm of opening respectively.



[1] Trimmer press motor (M32)
[2] Trimmer board
[3] Front side direction
[4] Press arms
[5] Trimmer press upper limit sensor (PS52)
[6] Trimmer press home sensor (PS53)
[7] Slide blocks
[8] Press direction

When changing the trimming position of the trimmer board or replacing the trimmer board via the I/O check mode, M32 rotates in the reverse direction to move up the press board higher than the position of the trimmer press upper limit sensor (PS52) and release the trimmer board [3] by pushing the trimmer board retaining spring [2] by the plate [1]. At the time, the opening is approximately 23 mm. The position is detected via overcurrent.



[1] Plate
[2] Trimmer board retaining spring
[3] Trimmer board

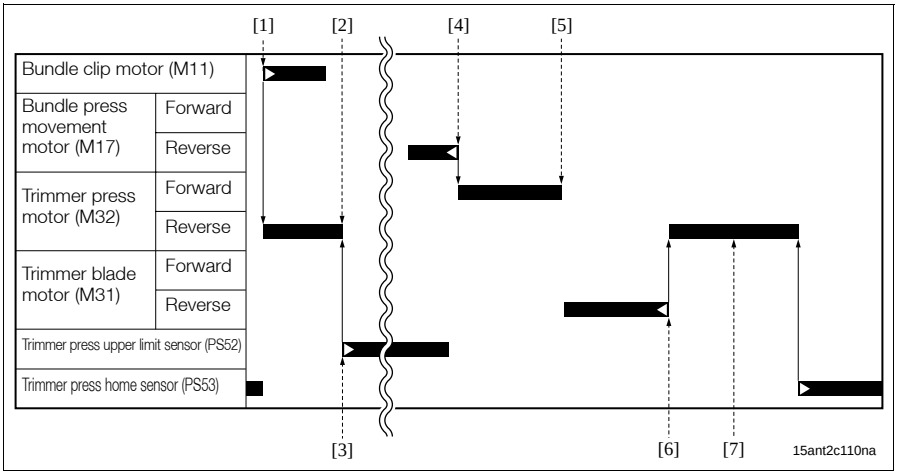
B. Control

(1) The number of the print paper is 16 or more (32 or more for the saddle stitched paper)

The trimmer press motor (M32) rotates in the reverse direction [2] when the bundle clip motor starts conveying the paper [1]. When the trimmer press upper limit sensor (PS52) [3] detects upper limit position of the trimmer board, M32 is stopped and waits for the paper. At this time, the opening is approximately 20 mm.

M32 rotates in the forward direction to press the paper when the paper is conveyed to the opening by the bundle press movement motor (M17) [4]. M32 stops when the overcurrent is detected [5].

The returning operation to the home position [7] is conducted when the trimmer blade motor (M31) completes the trimming [6].



[1] Conveyance by the bundle clip started
[2] Opening operation
[3] Stopped when the opening is approx. 20 mm
[4] Conveyance of the trimmed paper completed
[5] Trimmer press completed
[6] Trimming completed
[7] Returning operation to the home position

⚠ **(2) The number of the print paper is 15 or less (30 for the saddle stitched paper)**

The trimmer press motor (M32) rotates in the forward direction to press the paper without widening the opening when the paper is conveyed to the opening.

9.3.2 Trimmer blade control

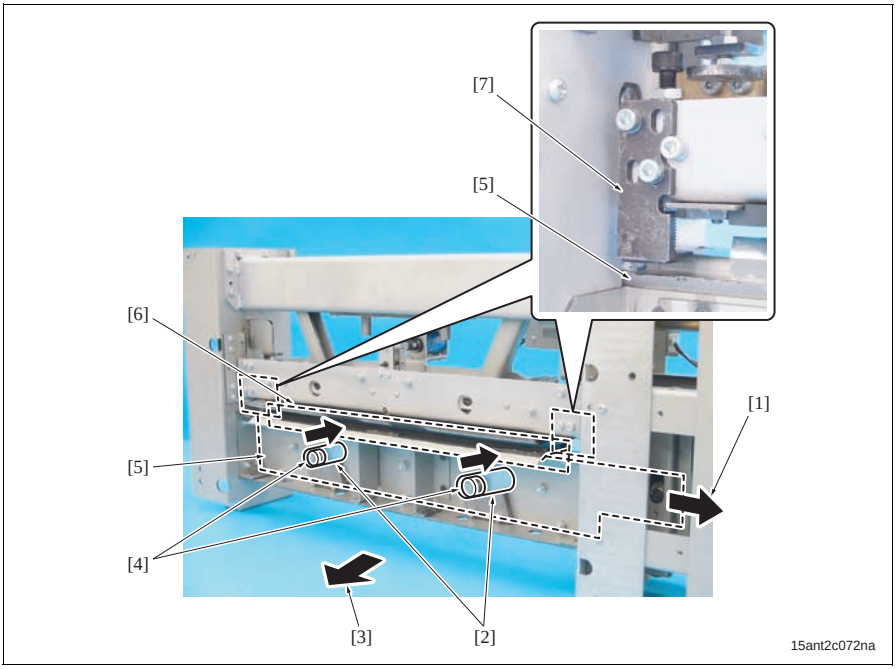
A. Mechanism

The trimming is conducted by the trimmer blade driven by the trimmer blade motor (M31) while the paper is pressed by the trimmer press.

The drive shafts [4] moves up in a slanting direction along with the drive guide holes [2] when M31 pulls the trimmer blade retaining plate [5] to the direction [1]. It trims the paper with the trimmer blade [6] attached on the trimmer blade retaining plate [5].

The completion of the trimming is detected by the overcurrent of M31 caused when the trimmer blade retaining plate [5] is contacted with the trimmer stoppers [7] attached to the trimmer press plate.

If the overcurrent of M31 is not detected even if the trimmer blade keeps moving up, the trimmer blade upper limit sensor (PS51) detects the upper limit.

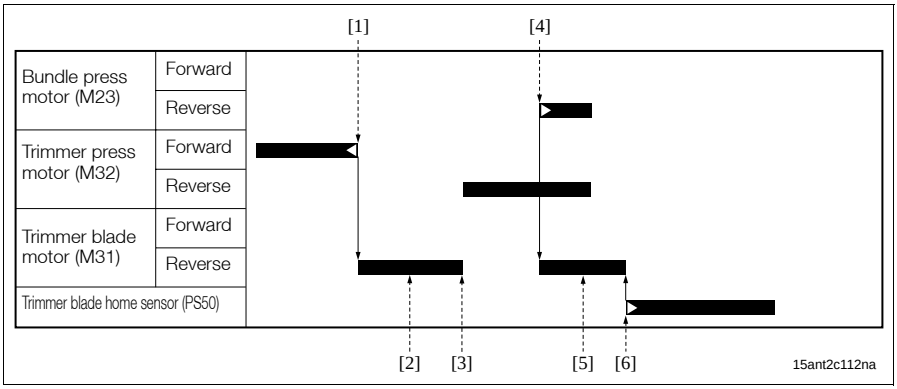


[1] Trimming direction
[2] Drive guide holes
[3] Front side direction
[4] Drive shafts
[5] Trimmer blade retaining plate
[6] Trimmer blade
[7] Trimmer stoppers

B. Control

The trimmer blade motor (M31) starts the trimming [2] when the trimmer press motor (M32) completes the press and stops [1]. M31 stops when the overcurrent is detected [3].

M31 starts the returning operation to the home position [5] when the bundle press motor (M23) starts releasing the press [4]. M31 stops when the trimmer blade home sensor (PS50) turns ON [6].



[1] Trimmer press completed

[2] Trimmer operation

[3] Stopped by the overcurrent

[4] Releasing the press started

[5] Returning operation to the home position

[6] Home position detected

9.3.3 Trimmer board control

A. Mechanism

The trimmer operation may be conducted improperly due to the damage on the trimmer board if the trimmer board is subjected to the trimmer blade many times at the same position. For this reason, the trimmer board is slid 1 mm backward for sheet cutting each time a job of 700 times trimming is completed.

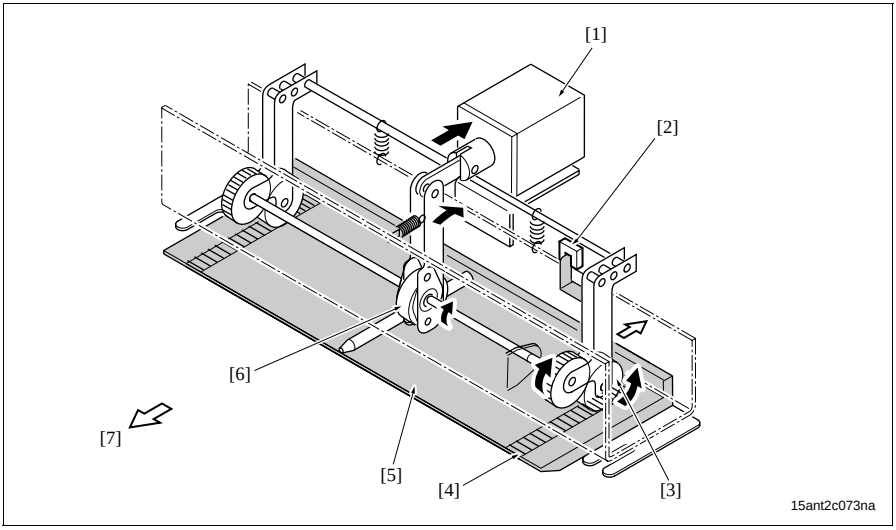
The trimmer board solenoid (SD11) [1] slides the trimmer board [5] with its fixing released by the trimmer press motor (M32).

The pinion [3] pushes the rack [4] 0.5 mm every time SD11 turns ON. The rotation of the pinion is transmitted to the rack by the one-way clutch [6] and pushes the trimmer board when SD11 turns ON. The pinion does not rotate and push the trimmer board when SD11 turns OFF by the one-way clutch.

Each time a job of 700 times trimming is completed, SD11 is turned on twice to move the trimmer board 1 mm. The trimmer board can be slid up to approximately 26 mm. The main body displays the message on its operation panel when the trimmer board replacement sensor (PS59) [2] turns ON. The trimmer operation is prohibited when the trimming is conducted 700 times since PS59 turns ON.

⚠ **Note**

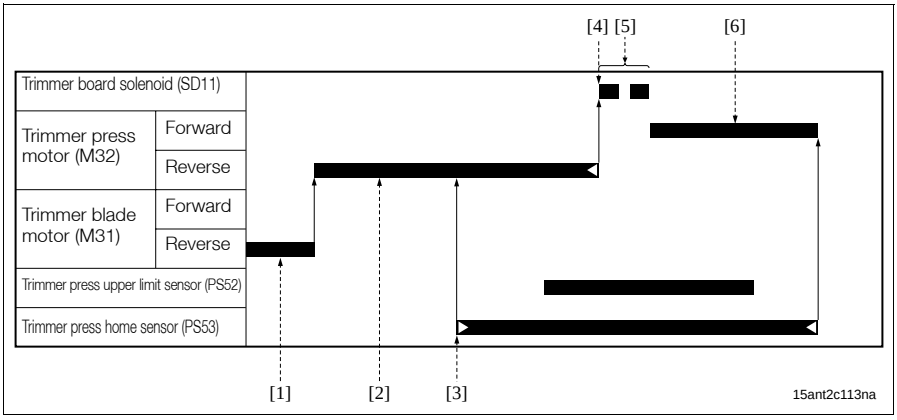
- **For C6500, the operation timing of the trimmer board solenoid can be selected among 700/500/300 (700 by default), and the travel distance can be selected among 1.0/1.5/2.0 mm (1.0 by default) from "Finisher adjustment" in service mode.**
- **For 1050, if the DIPSW22-5 setting in service mode is changed to 1, the operation timing of the trimmer board solenoid becomes selectable among 700/500/300 (700 by default) on the adjustment screen in the user mode.**
- **The barr may occur on the trimmed edge of the paper before the movement cycle of the trimmer board depending on the paper type.**



[1] Trimmer board solenoid (SD11)
[2] Trimmer board replacement sensor (PS59)
[3] Pinion
[4] Rack
[5] Trimmer board
[6] One-way clutch

B. Control

The trimmer press motor (M32) starts the returning operation [2] to the home position when the 700th trimmer operation [1] is completed. M32 does not stop by defection of the trimmer press home sensor (PS53) [3]. The opening keeps widening until the overcurrent of M32 is detected [4]. When M32 stops, the trimmer board solenoid (SD11) turns ON and OFF twice [5] to move the trimmer board 1 mm. Then, M32 starts the returning operation to the home position [6].



[1] 700th trimmer operation

[2] Opening operation of the trimmer press

[3] Home position detected

[4] Overcurrent of M32 detected

[5] Trimmer board moved 1 mm

[6] Returning operation to the home position

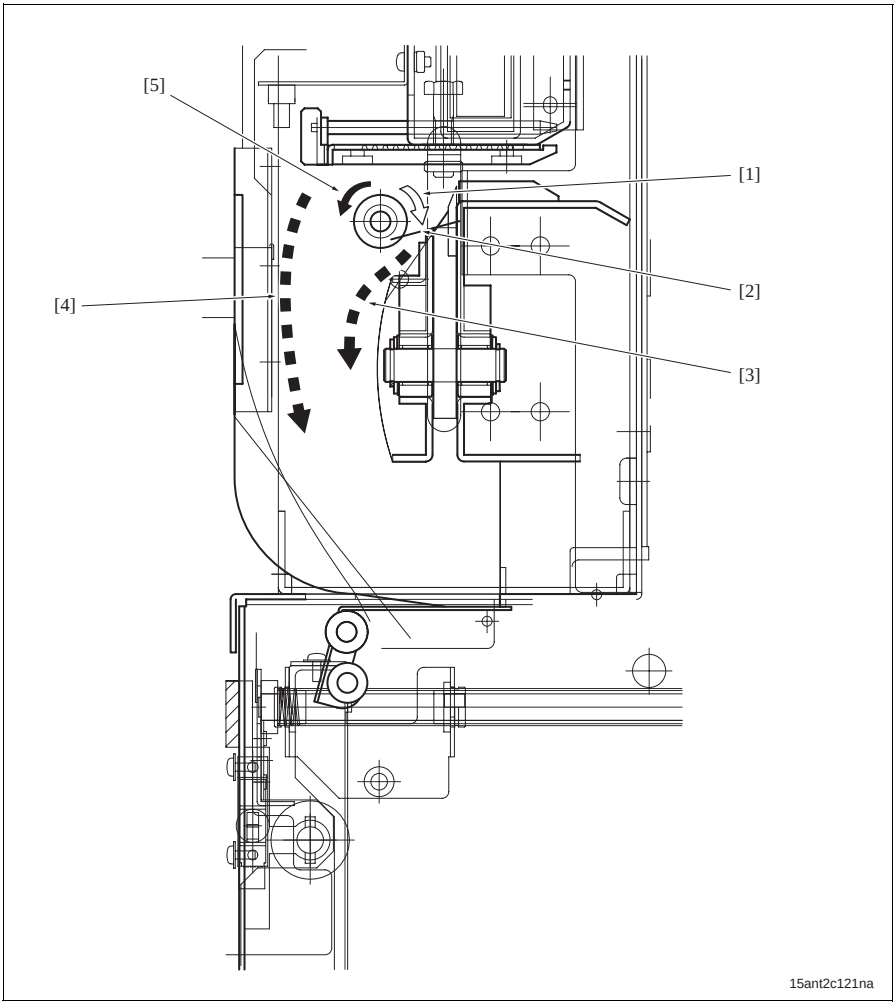
9.3.4 Trimmer paddle

⚠ **A. Mechanism**

The trimmer paddle [2] is provided to prevent the saddle-stitched paper from creating trails with scraps by getting into the paper during the press operation, and to drop the scraps forcibly. The trimmer paddle is driven by the trimmer paddle motor (M33).

Trimming amount is 15mm or less: The M33 motor rotates in reverse [1] to drop [3] the trimming scraps with the trimming paddle.

Trimming amount is more than 15mm: The M33 motor rotates forward to rake and drop the scraps to the wider dropping path [4].



[1] Trimmer paddle (M33) reverse direction

[2] Trimmer paddle

[3] Dropping path
(Trimming amount is 15mm or less)

[4] Dropping path
(Trimming amount is more than 15mm)

[5] Trimmer paddle (M33) forward direction

⚠ **B. Control**

In trimming mode, the trimmer paddle motor (M33) starts forward/reverse rotation after paper clipping is operated by the bundle clip motor (M11), and then the M33 motor stops when the trimming JOB is finished.

If the trimming amount value is set in the "Trimming adjustment" in service mode, the forward/reverse rotation of motor is controlled by the trimming amount that is added the adjusted value. (Edges of standard sized paper is trimmed by 2mm even when the adjutment value is set to 0.)

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